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Columbia University
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FACULTIES OF
POLITICAL SCIENCE, PHILOSOPHY
AND
PURE SCIENCE

ANNOUNCEMENT

1899—1900

COLUMBIA UNIVERSITY

THE UNIVERSITY offers the following courses :

In COLUMBIA COLLEGE :

A four-years' course leading to the degree of A.B.

In the SCHOOL OF LAW :

A three-years' course leading to the degree of LL.B.

In the SCHOOL OF MEDICINE (College of Physicians and Surgeons) :

A four-years' course leading to the degree of M.D.

In the SCHOOL OF MINES :

A four-years' course in	Mining Engineering leading to the degree of	E.M.
" " "	Mining and Geology " "	E.M.
" " "	Metallurgy " "	Met.E.

In the SCHOOL OF CHEMISTRY :

A four-years' course in	Analytical Chemistry leading to the degree of	B.S.
" " "	Industrial Chemistry " "	B.S.
" " "	Organic Chemistry " "	B.S.

In the SCHOOL OF ENGINEERING :

A four-years' course in	Civil Engineering leading to the degree of	C.E.
" " "	Sanitary Engineering " "	C.E.
" " "	Electrical Engineering " "	E.E.
" " "	Mechanical Engineering " "	Mech.E.

In the SCHOOL OF ARCHITECTURE :

A four-years' course in Architecture leading to the degree of B.S.

In TEACHERS COLLEGE :

Certain courses that are accepted in partial fulfilment of the requirements for the degrees of A.B., A.M., and Ph.D. ; besides various courses leading to the Teachers College diploma.

Also many courses under the various faculties, especially the Faculties of Philosophy, Political Science, Pure Science, and Applied Science, leading to the university degrees of Master of Arts and Doctor of Philosophy. A combination of courses under the Faculties of Law and Political Science leads to the degree of Master of Laws.

The various courses comprising the first-year work in the School of Law, the School of Medicine, and the School of Architecture, and also those comprising the first- and the second-year work in the School of Mines, the School of Chemistry, and the School of Engineering, are open, as electives, to students in the College who have become such not later than the beginning of the Junior year. By a judicious arrangement of his course, such a student may qualify himself to enter the second year in the School of Law, the School of Medicine, or the School of Architecture, or the third year in the Schools of Mines, Chemistry, or Engineering, at the completion of his collegiate course for the degree of Bachelor of Arts.

In addition to the regular courses that lead to the various degrees, Columbia University, in order to meet the needs of persons who wish to make a serious study of any special branch of knowledge, offers to them, according to their stage of advancement, special courses in Philosophy, in History, in Literature and the Languages, and, under certain restrictions, in Pure and Applied Science. For admission to any one of these special courses, the student must show that he is competent to take the course. On the completion of such special course a certificate will be granted by the faculty under which his principal subject lies.

Information and circulars as to any of the above courses may be had by addressing the Secretary of the University. The annual circulars are issued in the Spring and are made as accurate as possible, but the right is reserved to change details of work offered, as circumstances require.

The catalogue of the University is published in December, and is sold at twenty-five cents a copy.

C C724Z9+P 1899/1900 CONTENTS ---

	PAGE
OFFICERS OF INSTRUCTION	I
Faculty of Political Science	I
Faculty of Philosophy	I
Faculty of Pure Science	3
OFFICERS OF ADMINISTRATION	5
GENERAL STATEMENT	7
ADMISSION	7
Candidates for a Degree	7
Special Students	8
Women	8
Auditors	8
Information as to Courses	8
Office Hours of Deans	8
REGULATIONS FOR THE UNIVERSITY DEGREES	9
MATRICULATION AND REGISTRATION	14
FEES	14
COMPARATIVE STATEMENT OF STUDENTS' EXPENSES	15
FELLOWSHIPS, SCHOLARSHIPS, AND PRIZES	15
COURSES OF STUDY AND RESEARCH FOR 1899-1900	22
Faculty of Political Science	22
History and Political Philosophy	23
Public Law and Comparative Jurisprudence	29
Economics and Social Science	31
Order of Studies	40
Academy of Political Science	40
Faculty of Philosophy	41
Philosophy, Education, Psychology, and Anthropology	41
Science of Language	48
Rhetoric and English Composition	49
English and Literature	50
Oriental Languages	52
Classical Philology	56
Germanic Languages and Literatures	60
Romance Languages and Literatures	62
Music	66
Teachers College Diploma	67
Faculty of Pure Science	68
Special Regulations	68
Anatomy	70
Astronomy	74

	PAGE
Bacteriology	76
Botany	78
Chemistry	82
Geology	89
Mathematics	92
Mechanics	94
Mineralogy	96
Physiology	98
Physiological Chemistry	100
Physics	101
Zoölogy	104
American Museum of Natural History	110
SCHEMES OF ATTENDANCE	112
Political Science	112
Philosophy	114
Pure Science	116
COMMITTEE ON EMPLOYMENT FOR STUDENTS	119
APPOINTMENT COMMITTEE	119
THE LIBRARY	120
THE GYMNASIUM	121
PUBLIC WORSHIP	121
ACADEMIC CALENDAR	122

OFFICERS OF INSTRUCTION

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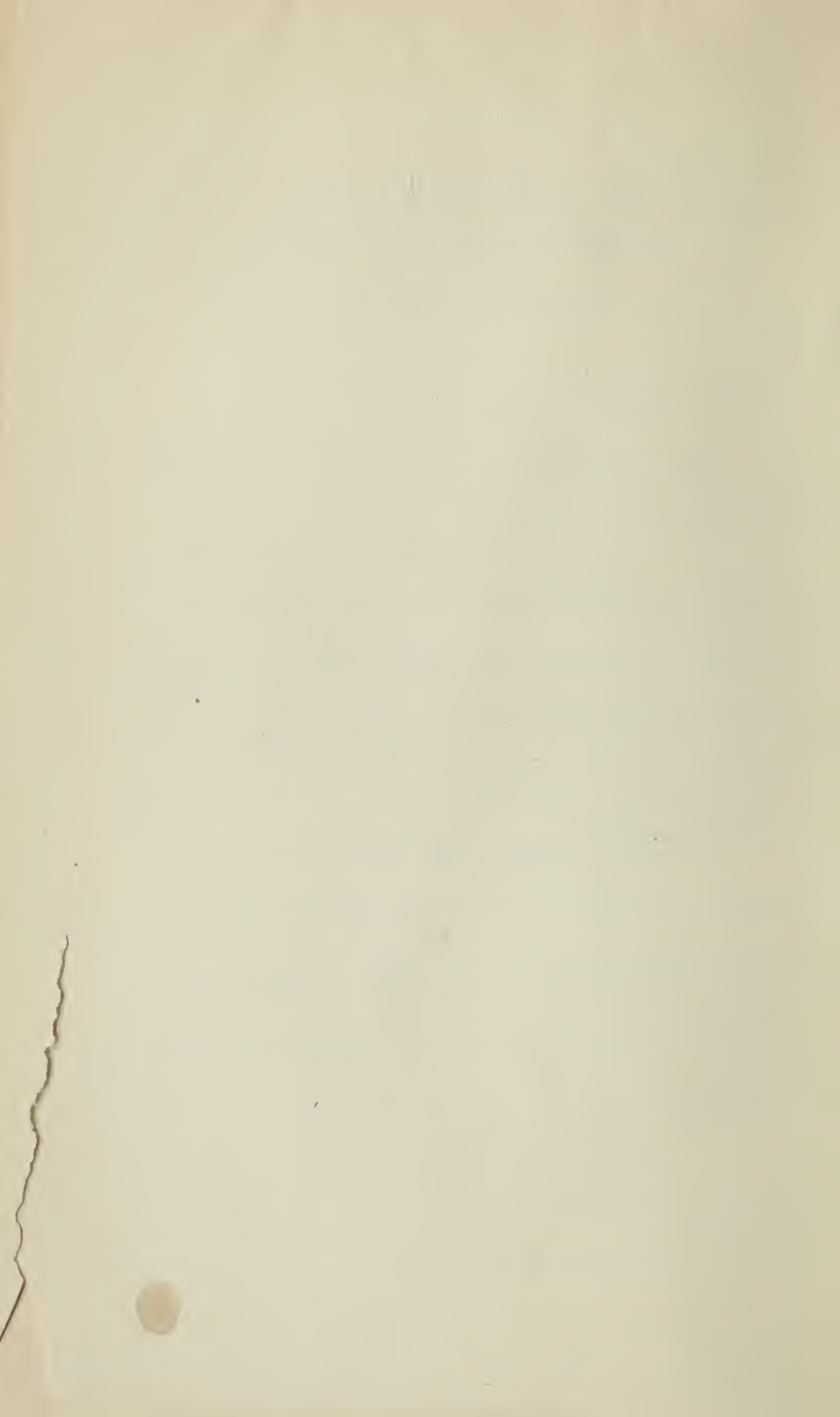
Columbia University in the City of New York

SUMMER SESSION

1900

There will be a summer session of Columbia University, including Teachers College, beginning in July, 1900. Courses will be offered in a wide range of subjects. Special attention will be given to the needs of teachers in elementary, secondary, and normal schools, and in colleges. Due credit for the courses of the summer session will be given to candidates for degrees or for Teachers College diplomas.

A special circular of the summer session, to be issued about January 1, 1900, containing a detailed announcement of the courses, information concerning fees, provisions for the board and lodging of students, and the like, will be sent upon application to the Secretary of the University.



OFFICERS OF ADMINISTRATION OF THE
UNIVERSITY

JAMES H. CANFIELD, A.M., LL.D., *Librarian*

WILLIAM H. H. BEEBE, *Secretary*

GEORGE F. FISHER, *Bursar*

GENERAL STATEMENT

The Faculties of Political Science, Philosophy, and Pure Science conduct the work frequently organized in the universities of the United States as a graduate School. These three faculties conduct the non-professional work of the University, leading to the degrees of Master of Arts and Doctor of Philosophy.

The Faculty of Political Science has charge of courses of instruction and research in history, economics and public law (p. 22).

The Faculty of Philosophy, of instruction and research in philosophy and education, psychology and anthropology, in letters and music (p. 41).

The Faculty of Pure Science, of courses of instruction and research in all branches of pure science (p. 67).

The courses indicated in this pamphlet may be taken without regard to their subdivision by faculties by properly qualified students.

ADMISSION

There are no examinations for admission, either as candidates for a degree or as special students. Students are admitted at any time during the year. They must, however, present themselves for registration at the opening of the first or second half-year in order to obtain full credit for residence. They may present themselves for examination for a degree whenever the requirements as to residence and an essay or dissertation have been complied with.

Students enrolled in the General, the Union, or the Jewish Theological Seminary, in the city of New York, who may be designated for the privilege by the authorities of these institutions, and accepted by the President of Columbia University, are admitted to the courses offered by these faculties free of all charge for tuition.

These institutions offer reciprocal privileges to students of Columbia University.

Candidates for a Degree

Candidates for the degrees of Master of Arts and Doctor of Philosophy must hold a baccalaureate degree in arts, letters, philosophy or science, or an engineering degree, or an equivalent of one of these from a foreign institution of learning. They must remain in residence for not less than one and two years, respectively. They are required to pursue courses of study or research in one major and two minor subjects, but are not held to any fixed number of hours of attendance a week.

Special Students

Students who are not candidates for a degree are admitted to any courses which they are found competent to undertake. Of this competency the head of the department in which the special student wishes to study shall be in each case the judge. If, at the close of his period of study in any department, the special student shall prepare such an essay and stand such examination as would be required of a candidate for the degree of Master of Arts offering that study as his major subject, he may be recommended by the head of that department and the dean of the proper faculty to the University Council for a special certificate of proficiency in the department that he has chosen.

Women

Certain courses under each faculty are open to women who are students of Barnard College or Teachers College, as candidates for a degree or as special students, on the same terms as to men. These courses under the Faculty of Political Science are open only to women who have the first degree.

For details see statement of courses under the various faculties.

Auditors

Certain courses are open to the public, men and women alike, on payment of an auditor's fee. No auditor will be admitted to any course without the consent of the instructor, previously obtained. Auditor's tickets must be procured from the Bursar, and shown to the instructors in charge of the courses for which they are issued, before attendance upon the courses is begun.

Information as to Courses

The Deans of the faculties concerned should be consulted by students wishing to pursue courses of study, to the end that suitable choice of courses may be made.

Office Hours of Deans

Professor BURGESS, Dean of the Faculty of Political Science, Room 404, Library. From September 26 to October 4, 1899, 3.30 P.M. to 4.30 P.M.

For the remainder of the year, M., Tu., W., and Th., 3.30 P.M. to 4.30 P.M.

Professor BUTLER, Dean of the Faculty of Philosophy, Room 419, Library. From September 26 to October 4, 1899, daily from 10.30 A.M. to 12.30 P.M.

For the remainder of the year, M., Tu., W., and Th. at 2 P.M.

Professor WOODWARD, Dean of the Faculty of Pure Science, Room 406, Fayerweather. From September 26 to October 4, 1899, 10 A.M. to 12.30 P.M.; 1.30 P.M. to 3.30 P.M.

For the remainder of the year, M., W. Th., and F., 11.30 A.M. to 12.30 P.M.

REGULATIONS FOR THE UNIVERSITY DEGREES

Master of Arts and Doctor of Philosophy

1 Candidates for the degrees of Master of Arts and Doctor of Philosophy must hold a baccalaureate degree in arts, letters, philosophy, or science, or an engineering degree, or an equivalent of one of these from a foreign institution of learning.

Every candidate for a higher degree must present to the dean of each school in which he intends to study satisfactory evidence that he is qualified for the studies he desires to undertake.

2 Candidates for the degrees of Master of Arts and Doctor of Philosophy must pursue their studies in residence for a minimum period of one and two years, respectively.* The year spent in study for the degree of Master of Arts is credited on account of the requirement for the degree of Doctor of Philosophy. Residence at other universities may be credited to a candidate. In certain cases and by special arrangement, time exclusively devoted to investigation in the field will be credited in partial fulfilment of the time required. No degree will be conferred upon any student who has not been in residence at Columbia University for at least one year.

3 Each student who declares himself a candidate for the degrees of Master of Arts and Doctor of Philosophy, or either of them, shall, immediately after registration, designate one principal or major subject and two subordinate or minor subjects.

Candidates are expected to devote at least one-half of their time throughout their course of study to the major subject. In the case of laboratory courses this implies two days a week, or its equivalent, as determined by each department. Each minor subject is intended to occupy approximately one-fourth of the time during one year for the degree of Master of Arts, and during two years for the degree of Doctor of Philosophy.

Minor subjects may not be changed except by the permission of the dean, to be given only on the written recommendation of the heads of the departments from which and to which the change is desired; major subjects may not be changed except by a special vote of the faculty in each case.

4 The subjects from which the candidate's selection must be made are :

UNDER THE FACULTY OF PHILOSOPHY

I. *Major Subjects* : 1. Philosophy ; 2. psychology ; 3. education ; 4. linguistics ; 5. literature ; 6. music ; 7. classical archæology and epigraphy ; 8. Greek language and literature, and, incidentally, Grecian history ; 9. Latin language and literature, and, incidentally, Roman history ; and the following, *including in each case the study of both the language and the literature* : 10. English ; 11. Germanic ; 12. Romance ; 13. Sanskrit (with Pāli) and Iranian ; 14. Semitic ; 15. anthropology. Nos. 3, 5, 11, 12, 13, and 14 count each as the equivalent of a major and one minor subject.

* In practice three years of study are usually necessary to obtain the degree of Doctor of Philosophy.

II. *Minor Subjects*: 1. Philosophy; 2. psychology; 3. logic; 4. education; 5. anthropology; 6. linguistics; 7. literature; 8. music; 9. Greek; 10. Greek archæology; 11. Latin; 12. Roman archæology; 13. Sanskrit; 14. Iranian; 15. English; 16. Anglo-Saxon; 17. Gothic; 18. Germanic philology; 19. German language and literature; 20. Scandinavian languages and literatures; 21. Romance philology; 22. French language and literature; 23. Spanish language and literature; 24. Italian language and literature; 25. Hebrew; 26. Arabic; 27. Assyrian; 28. Syriac; 29. Ethiopic; 30. Semitic epigraphy; 31. Turkish; 32. Armenian.

In his choice of subjects under this faculty, the candidate is limited by the regulation that not more than two of the three subjects may be selected from those offered by any one department. A major subject will involve attendance at lectures and seminars amounting to four or more hours weekly; a minor subject will involve attendance of two or more hours weekly.

UNDER THE FACULTY OF POLITICAL SCIENCE

Group I.—History and political philosophy; 1. European history; 2. American history; 3. political philosophy.

Group II.—Public law and comparative jurisprudence; 1. Constitutional law; 2. international law; 3. criminal law; 4. administrative law; 5. comparative jurisprudence.

Group III.—Economics and social science; 1. Political economy and finance; 2. sociology and statistics.

In his choice of subjects under this faculty, the candidate is limited by the regulation that not more than two of the three subjects may be selected from any one of the above groups, and by the following rules:

Candidates offering European history as the major subject, must offer American history as one of the minor subjects, and *vice versa*.

Candidates offering political economy and finance as the major subject, must offer sociology and statistics as one of the minor subjects, and *vice versa*.

Candidates will not be permitted to offer constitutional law alone as the major subject for the degree of Doctor of Philosophy, but must combine with it the course on general international law or on comparative administrative law.

Candidates offering international law, or criminal law, or administrative law as the major subject, must take constitutional law as one minor subject.

Candidates will not be permitted to offer criminal law alone as the major subject for the degree of Doctor of Philosophy, but must combine with it the course on general international law.

To be recognized as a major subject for the degree of Master of Arts the courses selected must aggregate at least two hours per week throughout the year, and must also include attendance at a seminar; for a minor subject for the degree of Master of Arts the attendance at a seminar is not required.

To be recognized as a minor subject for the degree of Doctor of Philosophy, courses must be taken, in addition to the requirements for a minor subject for the degree of Master of Arts, aggregating two hours weekly. All the courses and seminars offered in the major subject must be taken by candidates for the degree of Doctor of Philosophy.

UNDER THE FACULTY OF PURE SCIENCE

Mathematics ; mechanics ; astronomy ; geodesy ; physics ; chemistry ; mineralogy ; geology ; palæontology ; lithology ; zoölogy ; botany ; physiology ; anatomy ; bacteriology.

In his choice of subjects under this faculty, the candidate is limited by the regulation that no two of the subjects selected may be in any one department, unless the consent of the faculty thereto shall have first been obtained.

UNDER THE FACULTY OF APPLIED SCIENCE

Mining ; metallurgy ; engineering (civil, mechanical, electrical, and sanitary) ; architecture.

The Faculty of Applied Science requires that at least one minor subject be taken under the Faculty of Pure Science.

A minor subject may be taken in the same department as the major, but no two minors may be taken in the same department.

5 Each student is given a registration book, which is signed by the professor or instructor in charge of each course of instruction or investigation at the beginning and end of each course. This registration book is to be preserved by the student as evidence of courses attended, and should be submitted to the deans of the several faculties at the end of each year, that proper credit may be given for the courses attended, after which the registration book becomes the permanent property of the student.

6 (a) Students desiring to be examined for the degrees of Master of Arts, Master of Laws, or Doctor of Philosophy, shall make application on or before April 1 of the academic year in which the examination is desired, on blanks provided by the University, to the Secretary of the University.

(b) Immediately after April 1, the Secretary of the University shall notify the Deans of the Faculties of Political Science, Philosophy, and Pure Science, and also the Bursar, of the names of students applying for examination for higher degrees in each of these three faculties, together with the subjects in which the candidate offers himself for examination and the degree for which he is a candidate.

(c) The examination shall be held under the authority and direction of the several deans.

(d) The results of such examinations shall be reported by the deans as soon as possible to the Bursar of the University, who shall transmit to the Secretary of the University Council the record of each successful candidate for a degree, as soon as such record is completed.

7 Each candidate for the degree of Master of Arts shall present an essay on some topic previously approved by the professor in charge of his major subject. Before the candidate is admitted to examination the professor in charge of his major subject must have signified his approval of such essay. This essay must be presented not later than May 1 of the academic year in which the examination is to take place. The Faculty of Political Science requires this essay to be a paper read during the year before the seminar of which the candidate is a member.

When the essay has been approved, the candidate shall file with the Librarian of the University a legibly written or typewritten copy of it. This copy is to

be written on firm, strong paper, eleven by eight and a half inches, and a space of one and a half inches on the inner margin must be left free from writing.

8 Each candidate for the degree of Doctor of Philosophy shall present a dissertation embodying the result of original investigation and research, on some topic previously approved by the professor in charge of the candidate's major subject. When such dissertation has been approved by the said professor, it shall be printed by the candidate, under the direction of the dean of the faculty, and one hundred and fifty copies shall be delivered to the faculty, unless, for reasons of weight, a smaller number be accepted by special action of the University Council. On the title-page of every such dissertation shall be printed the words: "Submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy, in the Faculty of——, Columbia University."

There shall be appended to each dissertation a statement of the educational institutions that the author has attended, a list of the degrees and honors conferred upon him, as well as the titles of his previous publications.

All dissertations for the degree of Doctor of Philosophy must be submitted for approval not later than April 1 of the academic year in which examination is desired.

In case of excessive cost and delay in publishing a dissertation which has been approved by a department and accepted for publication by a reputable journal or scientific or literary association, the degree of Doctor of Philosophy may be conferred. The facts in every such case concerning the publication are to be certified to the Council by the faculty concerned.

In the Faculty of Political Science, with the consent of the Dean and the professor in charge of the candidate's major subject, the examination may be held before the printed dissertation is submitted.

The Faculty of Pure Science requires the dissertation to be printed in the size and form of the annals or the memoirs of the New York Academy of Sciences, according to the nature of the subject. Final examination may be granted upon acceptance of the dissertation by the department concerned.

The Faculty of Applied Science requires the dissertation to be printed in the size and style of the School of Mines *Quarterly*, and delivered to the Faculty not later than May 1 of the academic year in which the examination is to take place.

9 Every candidate for the degree of Doctor of Philosophy, must pass, besides such other examinations as the faculty may require, an oral examination on all three subjects, and must defend his dissertation, in the presence of the entire faculty or of so many of its members as may desire to attend. The ability to read at sight French and German, to be certified in each case by the dean of the faculty concerned, is required by all the faculties. The Faculties of Philosophy and Political Science ordinarily require also the ability to read Latin at sight, but this requirement may be waived for reasons of weight.

10 Students holding college degrees, who shall have completed with marked distinction one of the regular courses in the School of Law, the School of Medicine, the School of Mines, the School of Chemistry, the School of Engineering,

or the School of Architecture, may be recommended for the degree of Master of Arts ; provided that in each case the candidate shall have taken additional work, under the direction of the Faculty of Philosophy, the Faculty of Political Science, or the Faculty of Pure Science, to the extent of a minor subject, as recognized by the faculty concerned, for not less than one academic year.

Every such candidate shall present an essay on some topic previously approved by the professor in charge of his minor subject. Before the candidate is admitted to examination the professor in charge of his minor subject must have signified his approval of such essay. This essay must be presented not later than May 1 of the academic year in which the examination is to take place. The Faculty of Political Science requires this essay to be a paper read during the year before the seminar of which the candidate is a member.

When the essay has been approved, the candidate shall file with the Librarian of the University a legibly written or typewritten copy of it. This copy is to be written on firm, strong paper, eleven by eight and a half inches, and a space of one and a half inches on the inner margin must be left free from writing.

II No student shall continue to be a candidate for the degree of Doctor of Philosophy for a longer period than three years from the time he ceases to be in residence.

Master of Laws

I Any student who has satisfactorily completed the regular course of study in Columbia College, to the close of the junior year, or in some other college maintaining an equivalent curriculum (every such case of equivalency to be considered on its own merit), shall be entitled to be recommended for the degree of Master of Laws upon certificates from the Faculty of Law and the Faculty of Political Science that he has satisfactorily completed a four-years' course of study under said faculties.

2 Every candidate for the degree of Master of Laws must elect from the subjects offered by said faculties, courses aggregating, in the four years, fifty-two hours per week, and must pass satisfactory examinations upon the subjects elected ; provided that not more than thirty-four hours of work may be elected either in the field of Private Law, or in that of Public Law, Social Ethics, History, and Economics.

3 Students, otherwise qualified, who have received the degree of Bachelor of Laws from this University, after pursuing the full course of study, shall be entitled, upon pursuing for an additional year a course of study of at least thirteen hours per week, under either or both of said faculties, and passing satisfactory examinations therein, to receive the degree of Master of Laws ; provided that no student shall receive the degree who has not studied and passed satisfactory examinations in Comparative Constitutional Law, Administrative Law, Roman Law, International Law, and in the three courses offered on Equity,* and who has not pursued here, or elsewhere, courses of instruction satisfactory to the Faculty of Political Science in History, Social Ethics, and Economics.

* Under this provision students would be allowed, but not required, to take History European Law, Conflict of Private Law, Law of Municipal Corporations, and the Law of Taxation.

4 Each faculty shall determine the order in which the subjects offered by it shall be taken, and the maximum amount of work to be done therein during any one year.

5 Students from other universities, colleges, or law schools, who shall have satisfactorily completed a course of study equivalent to at least one term of thirteen hours per week in the subjects indicated in Section 2, after receiving a bachelor's degree, may be excused from the corresponding number of terms of the four-years' residence required at Columbia, provided that in no case shall any one receive the degree of Master of Laws who has not spent at least four years in the study of the said subject in some university, college, or law school; and the decision whether work at another institution shall be accepted as equivalent to work at Columbia, shall rest, as far as the studies under the Faculty of Law are concerned, with the Faculty of Law, and as far as the studies under the Faculty of Political Science are concerned, with the Faculty of Political Science. But neither faculty shall admit a student from another university, college, or law school, to examination for the degree of Master of Laws without a residence of at least one year in this University.

MATRICULATION AND REGISTRATION

Each student on first connecting himself with Columbia University is required to sign the matriculation book in the office of the Bursar, and pay the required fees. Immediately after matriculation, and before entering upon his studies each year thereafter, every student who desires to pursue his studies, either wholly or in part, under the direction of any of these faculties, must register himself in the office of the President, Room 213, Library; office hours 9 A.M. to 5 P.M. He will then receive a registration book. Until his registration is completed, no student is entitled to attend any university exercises whatever, nor will any attendance previous to matriculation and registration be counted as part of the residence required for a degree.

FEES

The matriculation fee for every student is \$5, payable once only, at the commencement of the student's connection with the University.

The annual fee for the use of the gymnasium, required to be paid by every regular student, is \$7. This entitles him to a locker and to the free use of the gymnasium and the baths, including all necessary laundry service.

The annual tuition fee for every candidate for a degree is \$150, payable in two equal instalments in October and February, with the proviso that the entire sum to be paid in fees by a candidate for the degree of Master of Arts shall not exceed \$150, and, for the degree of Doctor of Philosophy, \$300. The fee for students not candidates for a degree is calculated at the rate of \$15 a year for each hour of attendance upon university exercises a week, with a maximum fee of \$150, except that in the School of Pure Science the maximum fee is \$200.

The fee for auditors (see p. 8) is calculated at the rate of \$20 a year for each hour of attendance a week upon university exercises, with a maximum fee of \$200. Auditors are permitted, at their option, to enroll themselves for a single half-year only, at one-half of the above-mentioned fee.

Special students who afterwards qualify as candidates for one of the higher degrees must pay, before being admitted to examination, the difference between the maximum fee for such degree and the sum of the fees paid by them as special students.

Holders of fellowships during 1899-1900 are exempt from all charges for tuition and from examination fees; after that year they must pay all fees.

The fees for examination for the degree of Master of Arts is \$25; for the degree of Doctor of Philosophy, \$35; for the degree of Master of Laws, \$25.

Comparative Statement of Students' Expenses for the Academic Year, October to June

BASED ON STUDENTS' STATEMENTS

	Low	Average	Liberal
Matriculation fee (First Year)	\$ 5	\$ 5	\$ 5
Tuition Fee	150	150	150
Gymnasium Fee	7	7	7
Books	15	30	40 up
College Incidentals	—	15	50 "
Room (32 weeks)	48	112	160 "
Board (32 weeks)	112	128	192 "
Clothes and Washing	35	75	125 "
All other Expenses	15	25	100 "
Total	\$387	\$547	\$829 "

FELLOWSHIPS, SCHOLARSHIPS, AND PRIZES

University Fellowships

Eighteen fellowships, known as "University Fellowships," are awarded by the Council, to those applicants who give evidence of special fitness to pursue courses of higher study and original investigation, the competition to be open to graduates of all colleges and scientific schools. Vacancies occurring in any such fellowships shall be filled in the same manner in which original appointments are made.

Additional university fellows may be appointed in cases where the original appointee waives the emolument of the fellowship while accepting the honor of the appointment, and in cases where a university fellow desires reappointment without emolument.

The application should be made prior to March 1, in writing, on blanks that will be furnished for the purpose, and addressed to the President of Columbia University. Applications received later than March 1 may fail of consideration. The term of the fellowship is one year, dating from July 1. Residence should begin October 1.

The candidate must give evidence

(a) of a liberal education, such as a diploma already granted, or about to be received, from a college or scientific school of good repute ;

(b) of decided fitness for a special line of study, such as an example of some scientific or literary work already performed ;

(c) of upright character, such as a testimonial from some instructor.

The value of each fellowship is \$650. Payments are made in quarterly instalments, beginning September 30.

Every holder of a fellowship will be expected to perform such duties as may be allotted to him in connection with his course of study, which course shall be such as to lead to the degree of Doctor of Philosophy. He will be expected to devote his time to the prosecution of special studies under the direction of the head of the department to which he belongs, and before the close of the academic year to give evidence of progress by the preparation of a thesis, the completion of a research, the delivery of a lecture, or by some other method. He must reside in New York or vicinity during the academic year.

No holder of a fellowship shall be permitted to pursue a professional or technical course of study during his term. With the written approval of the President, but not otherwise, he may give instruction or assistance in any department of the University.

A fellow may be reappointed at the end of a year for reasons of weight. No fellow may be reappointed for more than two terms of one year each.

As these fellowships are awarded as honors, those who are disposed, for the benefit of others or for any other reason, to waive the pecuniary emoluments may do so, and still have their names retained on the list of fellows.

Tyndall Fellowship

A fellowship known as the "John Tyndall Fellowship for the Encouragement of Research in Physics" was endowed by John Tyndall, LL.D., Professor of Natural History in the Royal Institution of Great Britain, November 2, 1885, by a gift of \$10,800.00 in trust, to apply the income in supporting or assisting "one or more American pupils who may have shown decided talents in physics, and preferably such as shall express the determination to devote their lives to the advancement of theoretic science and original investigations in that department of learning." This fellowship is awarded to some suitable person, who is either a graduate of or a student in the University, but not necessarily a candidate for a degree. Such fellow shall be appointed by the Council upon the recommendation of the head of the department of Physics. Such appointments shall always be for the term of one year only, but the fellow, for the time being, shall be eligible for appointment from year to year, upon like recommendation. The fellow so appointed shall be entitled to receive during his term of office the net income of the capital sum constituting the endowment, to be paid in four quarterly instalments on the usual quarter days, upon the certificate of the President ; and the Trustees guarantee that such net income will amount to at least \$648 a year, being six per cent. upon \$10,800, the fund presented to the University by Professor Tyndall.

Barnard Fellowship

A Fellowship known as the "Barnard Fellowship for Encouraging Scientific Research" was endowed by the bequest of \$10,000 left by President F. A. P. Barnard for the purpose of encouraging scientific research. The fellowship is of the annual value of \$500, and is awarded to a graduate of the College or of the Schools of Mines, Chemistry, Engineering, or Architecture, who has evinced decided aptness for physical investigation and who may be disposed to devote himself to such investigation for some years continuously. Such fellow shall be appointed by the Council upon the joint recommendation of the faculties of the College and Applied Science. Such appointment shall be for the term of one year only, but the fellow, for the time being, shall be eligible to reappointment from year to year upon like joint recommendation.

Nominations should be made to the President on or before April 1.

Duties of Tyndall and Barnard Fellows

It shall be the duty of a Barnard or John Tyndall fellow to devote himself faithfully to the investigation of some subject in physical science at this university, or at some other in this country or abroad, under the supervision of some known physicist approved by the President and the head of the department of Physics. He shall make a report quarterly to the President, giving an account of the work in which he has been engaged during the three months preceding; which report shall be certified by the physicist superintending and directing him. In case of failure faithfully to fulfil the obligations imposed upon him, such fellow shall forfeit all privileges and emoluments conferred upon him by his appointment to the fellowship, and the Council may at any time declare the fellowship to be vacant.

Drisler Fellowship

A fellowship known as the "Henry Drisler Fellowship in Classical Philology," of the annual value of \$500, was established in 1894 in commemoration of the semi-centennial in the service of the University of Henry Drisler, LL.D., of the Class of 1839, who held in the University the chairs of both Latin and Greek.

Applicants for this fellowship must be Bachelors of Arts of this university, or some other college or university of equivalent standing, and must have pursued the study of Greek and Latin throughout their undergraduate course. They must present testimonials from their instructors in Greek and Latin as to their zeal and success in the study of these languages, and must give evidence of fitness for a wider and more profound study of the same, and for independent research. Such evidence may be shown by the results of a special examination or by the production of an essay or published treatise in some department of classical study. Applicants must also have a sufficient knowledge of French and German to use those languages readily in the prosecution of their studies, and must present a certificate of good moral character.

The appointment to the fellowship will be made by the University Council on the joint recommendation of the professors of Greek and Latin. The appointment shall be for one year, and the holder, for reasons of weight, may be reappointed; but the fellowship shall not be held by the same person for more than three years.

The fellow must study at this university under the direction of the professors of Greek and Latin, unless permitted by the Council to spend a year in some foreign university or in the American School of Classical Studies at Athens.

Mosenthal Fellowship

This fellowship was established in 1898 in memory of the late Joseph Mosenthal, of New York City, and is designed to aid talented students of musical composition in the study of their art either here or abroad.

It is awarded every other year, and its value at each award is \$675.

The appointment to the fellowship will be made by the University Council on the recommendation of the Professor of Music.

The fellow must pursue his or her studies either at Columbia University or under the direction of some master approved by the President and Professor of Music. Applicants are required to have a thorough knowledge of harmony and the elements of counterpoint. This fellowship, which is open to both men and women, will be bestowed for the first time at Commencement, 1899. Applications should be made prior to March 1, in writing, addressed to the President of Columbia University, on blanks prepared for the purpose, which will be sent upon request.

Schiff Fellowship

The Schiff Fellowship in Political Science, the gift of Mr. Jacob H. Schiff, and of an annual value of \$600, is open to graduates holding a first degree from any college or scientific school of good standing either in this country or in Europe. Appointment to the fellowship is made each year by the University Council upon the recommendation of the Faculty of Political Science, and the recommendation of this faculty is based upon the nomination following: On or before April 1 of each academic year the Faculty of Political Science shall propose to Mr. Jacob H. Schiff while living the name of a suitable person for nomination by him. After Mr. Schiff's death, his oldest living male descendant bearing his family name is to enjoy the right to nominate in the same manner. Should the family name become extinct, the right of nomination is to inhere in the oldest direct descendant of Mr. Schiff, bearing any other name, who is a resident of the United States. Should no nomination be made by Mr. Schiff or his successor after proper notification by the Faculty of Political Science, the President of the University is to have the right to nominate. Should the recommendation made by the Faculty be unacceptable to the person having the right of nomination, the Faculty shall propose other names until a nomination is made.

Fellowship Regulations

No fellow shall be allowed to accept remunerative employment except by permission of the President, and the acceptance of any such employment, without such permission, shall operate to vacate the fellowship.

All fellows, except as hereinbefore provided, shall be required to pursue their studies during the term of their fellowship at the University, unless permission be granted by the President to study elsewhere.

All fellows shall be governed by such rules and regulations, not inconsistent with the statutes, as may be prescribed by the Council.

University Scholarships

Thirty university scholarships are awarded annually to students in the Faculties of Political Science, Philosophy, and Pure Science. These scholarships are awarded under the following regulations, prepared by the authority of the University Council and with its approval :

1 The university scholarships are open to all graduates of colleges and scientific schools whose course of study has been such as to entitle them to be enrolled at Columbia as candidates for a university degree.

2 These scholarships are tenable for one academic year, with a possibility of renewal for one year longer. They are of an annual value of \$150 each.

3 Payments will be made to university scholars in two equal instalments ; one on October 1 and one on February 1. University scholars will be required to pay all of the fees established for matriculation, tuition, examination, and for the use of the gymnasium.

4 Applications for university scholarships should be made in writing, on blanks that will be furnished for the purpose, and addressed to the President of Columbia University. Applications must be filed not later than May 1. Should an unsuccessful applicant for a fellowship apply for a scholarship, the only information required from him will be that contained in the formal application for the fellowship.

5 The university scholarships will be awarded by the University Council at its regular meeting in May. The award will be made after applications have been examined and recommendations made by the Committee on University Scholarships. In making these recommendations the Committee will give preference to those candidates for university fellowships who have failed of appointment by the University Council after having been recommended for the same by any faculty or department.

6 University scholars will be required to enroll themselves as candidates for a degree and to pursue a regular course of study leading thereto.

President's University Scholarships

In addition to the University Scholarships there are eight President's University Scholarships, each of the value of \$150, awarded in like manner and governed by the same regulations as the University Scholarships.

National Society of the Sons of the American Revolution Medal

The National Society of the Sons of the American Revolution offers a silver medal under the following regulations :

1 Competition shall be open to members of the senior class in the College, and to first-year students, not graduates of the College, studying under any of the faculties of the University.

2 Each essay must contain not less than 1600 and not more than 2000 words and shall be upon the subject : " The Principles Fought for in the War of the Revolution."

3 A typewritten copy of each essay must be presented to the President not later than May 1.

4 The Committee of Award shall consist of the professors giving instruction in American History.

5 The prize shall in no case be awarded to an essay defective in English composition.

The award, if made, will be announced by the President at Commencement.

A similar tender has been made to the principal colleges of the country, and the essays receiving the silver medals will be submitted to a committee of the National Society in competition for a gold medal to be awarded to the writer of the essay deemed most meritorious.

Bunner Medal

The H. C. Bunner Gold Medal, provided for by the interest upon a fund of one thousand dollars, established in November, 1896, by the friends of the late Henry Cuyler Bunner, is awarded annually at Commencement to the candidate for a Columbia degree who shall present the best essay on an assigned subject in American Literature. Essays must be submitted to the President on or before May 1. The award will be made by a committee to be appointed by the President. The subject for the essay to be handed in May 1, 1899, is "Daniel Webster as an Orator"; for 1900, "The American Indian in American Poetry"; for 1901, "American Humor prior to 1870."

Prize in Political Economy

An annual prize of \$150 for the best essay on some subject in political economy has been established by Mr. Edwin R. A. Seligman, of the Class of 1879. Competition for the prize is open to all members of the School of Political Science. The topic selected must be approved by the Faculty, and the essay itself must not be less than twenty thousand words in length.

Bennett Prize

A prize of \$40, to be given on Commencement Day, has been established by Mr. James Gordon Bennett. The prize is awarded by the Faculty of Political Science for the best essay in English prose upon some subject of contemporaneous interest in the domestic or foreign policy of the United States. The competition is open to seniors in the College, whether regular or special students, and to all students under any of the faculties of the University, who have not yet taken the baccalaureate degree in arts, letters, or philosophy, provided that they take courses amounting to six hours a week throughout the year in the School of Political Science. Essays must be submitted to the President on or before May 1. If no satisfactory essay is received no award will be made. No award will be made for any essay that is defective in English composition.

Toppan Prize

A prize known as the Robert N. Toppan prize, of \$150, maintained by Robert N. Toppan, LL.B. '61, is awarded annually to the member of the School of Political Science who shall pass the best written examination upon a paper prepared by the professor in charge of the department of Constitutional Law.

Prize Lectureships

The Trustees have established in the School of Political Science three prize lectureships of the annual value of \$500 each, tenable for three years. The power of appointment is vested in the Faculty. One of these three lectureships becomes vacant at the close of each academic year. The previous holder may be reappointed. The conditions of competition are as follows :

1 The candidate must be a graduate of Columbia University in the School of Political Science or the School of Law. In the latter case he must have pursued the curriculum of the School of Political Science for at least two years.

2 He must be an active member of the Academy of Political Science (see p. 40).

3 He must have read at least one paper before the Academy of Political Science during the year next preceding the appointment.

The duty of the lecturer is to deliver annually, before the students of political science, a series of at least twenty lectures, the result of original investigation.

These prize lectureships will be found especially useful and welcome to graduates of the school who propose to devote themselves to an academic career, and who in this way may acquire the experience and acquaintance with university methods of teaching which will stand them in good stead in their future career.

COURSES OF STUDY AND RESEARCH FOR 1899-1900

FACULTY OF POLITICAL SCIENCE

In its course of instruction the Faculty of Political Science undertakes to give a complete general view of all the subjects of public polity, both internal and external, from the threefold point of view of history, law, and philosophy. The prime aim is therefore the development of all the branches of the political and social sciences. The secondary and practical objects are :

- (a) To fit young men for all the political branches of the public service
- (b) To give an adequate economic and legal training to those who intend to make journalism their profession
- (c) To supplement, by courses in public law and comparative jurisprudence, the instruction in private municipal law offered by the Faculty of Law
- (d) To educate teachers of political and social science

To these ends courses of study are offered of sufficient duration to enable the student not only to attend the lectures and recitations with the professors, but also to consult the most approved treatises upon the political sciences and to study the sources of the same

Young men who wish to obtain positions in the United States Civil Service—especially in those positions in the Executive Departments at Washington for which special examinations are held—will find it advantageous to follow many of the courses under the Faculty of Political Science. Some of the subjects upon which applicants for these positions are examined are treated very fully in the curriculum of the school. Thus, extended courses of lectures are given on political history, diplomatic history and international law, government, statistics, finance, and administration

The graduate courses in Economics and History are open to women having the bachelor's degree on the same terms as to men. Women wishing to enter any of these courses must register at Barnard College or at Teachers College

None of the courses in the School of Political Science is open to auditors

The course of study embraces instruction and research in three groups of subjects :

- 1—History and Political Philosophy
- 2—Public Law and Comparative Jurisprudence
- 3—Economics and Social Science

Seminars

Outside of the regular instruction in the various subjects by lecture, it is the intention to furnish the students an opportunity for special investigation of historical, legal, economic, and social questions under the direction of the professors. This is done by means of original papers prepared by the students. The papers are read before the professor and the students, and are then criticised and discussed. There will be at least one seminar in each subject. The number of meetings and the topics to be discussed are determined each year. Attendance at a seminar in the major subject is necessary on the part of candidates for the degrees of Master of Arts or Doctor of Philosophy.

There are also preliminary seminars in history designed primarily for those who are not fully prepared for the more advanced work. A preliminary seminar taken by a candidate for the degree of Bachelor of Arts will count for one hour toward the fifteen hours necessary for a degree.

GROUP I—HISTORY AND POLITICAL PHILOSOPHY

Courses 10, 12, 13, 15, 32, 33, 34, 35, 37, 41, and 42 are open to women having the bachelor's degree on the same terms as to men.

The student is supposed to be familiar with the outlines of European history, ancient and modern, as well as of American history. Students who are not thus prepared are recommended to take the introductory courses in history in the College. These are as follows:

History A—*Epochs of Ancient, Mediæval, and Modern History.* Dr. SHEPHERD

Three hours

History 1—*Mediæval and Modern Political History to 1648.* Dr. SHEPHERD

Two hours

History 2—*Continental European History, modern and contemporaneous, 1648-1889.* Dr. CUSHING

Two hours

History 3—*English History to the Reform Bill (1832).* Dr. CUSHING

Two hours

History 4—*History of the United States to the close of Reconstruction (1877)*
Dr. CUSHING

Three hours

History 5—*Transition Epochs European History.* Professor SLOANE

Two hours

Subject A—European History

History 6—*History of Great Britain during the Eighteenth and Nineteenth Centuries.* Professor OSGOOD

Two hours a week

Given in 1899-1900 and in alternate years thereafter

In this course a somewhat detailed account will be given of the political development of England during the last two centuries. Reference will also be

made to the relations with Scotland and Ireland. This part of the course will be a continuation of History 16. A part of the time will be devoted to the expansion of England and to the history of the downfall of the old, and to the rise of the new, colonial system. This will serve as a continuation of History 32 and 33. Lectures and assigned reading

History 7—*Political and Constitutional History of Rome*. Professor MUNRO SMITH *

Two hours a week first half-year

This course treats (1) of the Roman city-state as organized under the kings and during the earlier part of the republican period; (2) of the Roman conquest of the Mediterranean basin, the organization and government of the provinces, and the effect of these changes upon the politics of the city; (3) of the organization and development of the empire under republican forms (*principatus*); and (4) of the absolute empire (*dominatio*) of Diocletian and his successors. Lectures, assigned reading, and discussions

History 10—*The Sources of Mediæval and Modern European History; Methods of Historical Study*. Professors ROBINSON and OSGOOD
Given in 1899-1900 and in alternate years thereafter

Two hours a week, second half-year. Hours to be arranged

While emphasis will be laid in all the historical courses on the sources of our knowledge, this will furnish a systematic view of the whole field, and will include practical bibliographical exercises on the part of the students

History 11—*Antecedents of Modern European History; The Reformation*. Professor ROBINSON

Two hours a week

The aim of this course is to furnish the student with such preliminary ideas of the Mediæval Church and of the culture and thought of the fourteenth and fifteenth centuries as shall permit an intelligent study of the Reformation. The development of the papal hierarchy, the sources of the power and the nature of the corruption of the Church will be considered, as well as the great reform movement of the fourteenth and fifteenth centuries, culminating in the Councils of Constance and Basle. The contrast between the tendencies of mediæval and modern thought will be illustrated by the writings of Dante and Petrarch. The peculiar political conditions of Italy and the phases of political speculation from Aquinas to Machiavelli will be sketched. The latter half of the course will include a consideration of the political and intellectual conditions in Germany at the opening of the sixteenth century; the character and success of the Lutheran Reform, taking into account the criticisms of Erasmus and of later writers like Döllinger, Hergenröther, Pastor, and Janssen; the course of the Reformation outside of Germany; Calvin and the "Institutes of Christianity," closing with the work of the Council of Trent

History 12—*Mediæval Institutions and Culture*. Professor ROBINSON

Two hours a week

Given in 1899-1900 and in alternate years thereafter

* Absent on leave. This course will not be given in 1899-1900.

No attempt will be made in this course regularly to trace the political history of the middle ages, but the time will be devoted to a topical study of the political and ecclesiastical organization of the states of Western Europe in the twelfth and thirteenth centuries. Special attention will be given to the Church, as the most important factor in the life of the time. *Luchaire's Manuel des Institutions françaises* will be used as a handbook. The origin and growth of the universities will be considered as well as the main literary currents as we find them exhibited in the works of some of the contemporaneous writers, from Abelard and John of Salisbury to Roger Bacon

History **13**—*Opening of the Lutheran Reformation (1517-26)*. Professor ROBINSON

Two hours a week

Given in 1900-1901 and in alternate years thereafter

A research course, dealing with the origin of the Protestant party in Germany. Special attention will be given to Luther's change of attitude between 1517 and 1521. Open only to those who can read German and Latin easily

History **14a**—*Continental History; France under Louis XVI; the Antecedents and Opening of the French Revolution*. Professor ROBINSON

Two hours a week, first half-year

This course will include a description of the organization of the French monarchy under Louis XVI; the development of the spirit of reform in the eighteenth century. The administration of Turgot will be discussed, and the progress of reform in France from the accession of Louis XVI to the completion of the Constitution of 1791 will be considered as a whole, with a view of showing the strict historical continuity between the Revolution and the conditions preceding it

History **14b**—*Continental History; the Age of the Revolution from 1791 to 1815*. Professor SLOANE

Two hours a week, second half-year

Open only to those who have taken course **14a**

This course is a narrative in lectures of the events which involved Europe in the general movement known as the French Revolution, of the reaction from Jacobinism in the Napoleonic period, and of the reconstruction of nationalities incident to the new ideas of rights and liberty. It is chiefly social and political, but takes account of the change in economic theory and practice

History **15**—*The Work of Napoleon*. Professor SLOANE

Two hours a week, first half-year

This is a research course for the most advanced students only. It is open to such selected individuals as give evidence of capacity for original research, and the ability to read French and German fluently is indispensable to admission. The topics are chosen by the instructor and the student works under his direction, given in personal consultations twice a week. The papers prepared are expected to be short monographs, thoroughly discussing the theme on the basis of the original authorities

History 16—*The Constitutional History of England to 1689.* Professor OSGOOD

Two hours a week

Given in 1900-1901 and in alternate years thereafter

The object of this course is, by means of lectures and outside reading, to give a review of the development of the English Constitution from the fifth century to the revolution of 1689. The work is based chiefly upon the writings of Stubbs, Gneist, Hallam, Gardiner, and Ranke

History 19—*History of the Primitive and the Undivided Catholic Church until 395 A.D.**

Three hours a week, first half-year

History 20—*History of the Western Catholic Church and of the Protestant Reformation, 395-1555 A.D.**

Three hours a week, second half-year

History 21—*History of Early Christian Creeds**

Two hours a week, first half-year

History 22—*Seminar in Later Mediæval and Modern European History.* Professor ROBINSON

Two hours every other week

History 23—*English Church History**

Two hours a week, first half-year

History 24—*History of Protestant Theology**

Two hours a week, second half-year

History 25—*History of the Roman Catholic Church since the Protestant Reformation**

Two hours a week, second half-year

History 26—*Seminar in Early Church History*

Two hours a week

Subject B—American History

History 30—*Transitions in American History.* Professor SLOANE

Two hours a week

Given in 1899-1900 and in alternate years thereafter

This course deals with those epochs of American history where its connection with that of Europe is closest. Those discussed in 1897-98 were the Discovery, the Expansion of Spain, and the Expansion of Europe. In 1899-1900 the topics will be: The Mastery of England, the Independence of her colonies, and the Making of the Nation. The emphasis of the discussions is put upon the value of the sources and on the details of research which establish facts and principles

History 31—*Political and Constitutional History of the United States.* Professor BURGESS

Two hours a week

* This course is given at the Union Theological Seminary

This course of lectures covers the history of the colonies and of the revolutionary war; the formation and dissolution of the confederate constitution of 1781; the federal constitution of 1787 and its application down to the civil war; the changes wrought in the constitution by the civil war, and the resulting transformation of the public law of the United States

History 32—*American Colonial History during the Seventeenth Century.*
Professor OSGOOD

Two hours a week

Given in 1899-1900 and in alternate years thereafter

This is an advanced lecture and investigation course. The subjects of study will be chiefly the corporation—or colony of the New England type—and the proprietary province, as forms of colonial government. The early history of Virginia as a royal province will be considered. The beginning of efforts on the part of Great Britain to assert imperial control over the colonies will also be traced. This course is open only to approved candidates for the degrees of A.M. and Ph.D., and to such special students as receive permission to attend

History 33—*American Colonial History during the Eighteenth Century.*
Professor OSGOOD

Two hours a week

Given in 1900-1901 and alternate years thereafter

This course begins at 1690 and ends at 1760. It is devoted to the study of the royal province as a form of colonial government, and of the British system and policy of colonial administration during the period of intercolonial wars. It is both a continuation of the preceding course and an introduction to the study of the American Revolution. It is open to the same class of students as History 32, and the method of instruction is the same as in that course

History 34—*European Politics and the War of 1812.* Professor SLOANE

Two hours a week, second half-year

Research course for the most advanced students only. It is given to selected individuals who show capacity for original research, and is open only to those who read French and German fluently. The topics are chosen by the instructor and the students work under his direction, given in personal consultations twice a week. The papers prepared are expected to be short monographs thoroughly discussing the theme on the basis of the original authorities

History 35—*The United States during Civil War and Reconstruction.*
Professor DUNNING

Two hours a week, first half-year

Given in 1899-1900 and alternate years thereafter

The object of this course is to describe the constitutional principles which came into play during the period from 1860 to 1877. Among the topics discussed in more or less detail are: The principles of the appeal to arms; the nature and scope of the "war power"; the status of the negro as affected by the war; the various theories of reconstruction; the adoption of the last three amendments to the constitution; the actual process of reconstruction; the so-called "force legislation," and the circumstances attending the final cessation of national interference in the Southern States

History 37—*Seminar in American Colonial History.* Professor OSGOOD
One hour a week

Subject C—Political History

History 40—*General History of Political Theories.* Professor DUNNING
Two hours a week

Every people known to history has possessed some form, however vague and primitive, of political government. Every people which has attained a degree of enlightenment above the very lowest has been permeated by some ideas, more or less systematic, as to the origin, nature, and limitations of governmental authority. It is the purpose of this course to trace historically the development of these ideas, from the primitive notions of primitive people to the complex and elaborate philosophical theories that have characterized the ages of highest intellectual refinement

Book I treats mainly of the political philosophy of Greece and Rome, with especial attention to the profound speculations of Plato and Aristotle

Book II discusses the political doctrines of early Christianity and the Christian Church, with the controversy of papacy and empire, and the elaborate systems of St. Thomas Aquinas and his adversaries

Book III treats of that age of renaissance and reformation in which Machiavelli and Bodin, Suarez and Bellarmine, Luther and Calvin, worked out their various solutions of the great problem, how to reconcile the conflicting doctrines of theology, ethics, and politics

Book IV covers the period during which the theories were wrought out which found realization in the English and French revolutions. Here are examined the doctrine of natural law as developed by Grotius and Puffendorf, the doctrine of divine right of kings with its corollary of passive obedience, as in Filmer and Bossuet, the theory of the constitutionalists, Locke and Montesquieu, and the idea of social contract, made most famous by Rousseau

Book V traces the various currents of thought since Rousseau; the idealism of Kant, Fichte, and Hegel, the reactionary philosophy which sought to overcome the tendencies of the revolution, the historical school of Burke and Savigny, and the English individualists like Bentham, Mill, and Spencer

History 41—*American Political Philosophy.* Professor DUNNING
One hour a week

Given in 1900-1901 and in alternate years thereafter

As the first nation to realize in practice many of the principles that characterize the modern state, the United States offers special opportunities for research to the student of political philosophy. In this course a twofold line of discussion is followed: First, by a study of the various documents of the revolutionary era, the Declaration of Independence, the constitutions, national, and commonwealth, and other state papers, the dominant ideas of the people

are derived from their official records. Second, the writings of the leading statesmen, like Hamilton, Jefferson, Calhoun, and Webster, as well as the more systematic and philosophical works of Lieber, Mulford, Brownson, Jameson, and others, are analyzed and subjected to critical comment

History 42—*Seminar in Political Philosophy.* Professor DUNNING
One hour a week

GROUP II—PUBLIC LAW AND COMPARATIVE JURISPRUDENCE

None of the courses in this group is open to women.

Subject A—Constitutional Law

Public Law 1—*Comparative Constitutional Law of the Principal European States and of the United States.* Professor BURGESS
Three hours a week

Comprehending a comparison of the provisions of the constitutions, principally of England, United States, France, and Germany, the interpretation of the same by legislative enactments and judicial decisions, and the generalization from them of the fundamental principles of public law common to them all

Public Law 5—*Seminar in Constitutional Law.* Professor BURGESS
Two hours a week

Subject B—International Law

Public Law 6—*History of Diplomacy.* Professor MOORE
Two hours a week, first half-year

The object of this course is to exhibit the evolution of the relations between independent states and the manner in which those relations are conducted. The history of the diplomatic system of Europe is traced from its beginnings to the present time, and an exposition is given of the religious, dynastic, territorial, and commercial struggles of which that system is the result. The first part of the course relates to the development of the European concert prior to the Peace of Westphalia. This is followed by an examination of the most important of the general European treaties, beginning with those concluded at the Congress of Westphalia in 1648, and ending with the Treaty of Berlin of 1878

Public Law 7—*History of American Diplomacy.* Professor MOORE
Two hours a week, second half-year

In the study of American diplomacy special attention will be given to the history and method of the diplomacy of the United States. The course will comprehend (1) the diplomacy of the revolution; (2) the period from the Treaty of Peace of 1783 to the termination of the war of 1812; (3) from the termination of that war to the civil war; (4) from the outbreak of that war to the present time

Public Law 8—*International Law*. Professor MOORE

Two hours a week

This course treats of the general principles of international law, as it has been developed by positive agreement, in the form of treaties and conventions, and by common usage, as shown in legislation, in the decisions of international tribunals, and of municipal courts, and in the conduct of nations. The rules thus discovered are discussed in the light of the principles of reason and justice, as scientifically presented by writers on international law, and an effort is made to trace the systematic establishment of the rules which govern intercourse among nations at the present day

Public Law 10—*Seminar in International Law*. Professor MOORE

Two hours a week

Subject C—Administrative Law

Public Law 16—*Comparative Administrative Law of the United States and the Principal European States*. Professor GOODNOW

Two hours a week

The purpose of this course is to present the general principles of the administrative law of the United States, both in the nation and in the commonwealths, and to compare them with the law of England, France, and Germany. The following list of topics will give a general idea of the particular subjects discussed: The principle of the separation or distribution of powers; the executive power; administrative councils; heads of departments, their tenure of office, their powers and duties; local (including municipal) government; officers, their appointment or election, their duties, their rights, removal from office; the administration in action; the control over the administration possessed by the higher administrative officers, the courts, and the legislature. Special attention will here be paid to the writs of *mandamus*, *quo warranto*, *certiorari*, *habeas corpus*, and prohibition, and their statutory substitutes, by means of which the courts exercise their control over the administration. The new courts will also be examined, which have been established in France and Germany during this century, and to which the name of administrative courts has been given

Public Law 18—*The Law of Taxation*. Professor GOODNOW

One hour a week

The subjects treated in this course are: The nature of taxes and the taxing power; the limitations placed by the constitutions, both national and commonwealth, upon the taxing power; the construction of tax proceedings; the rules of law relative to the particular taxes, both national and commonwealth, levied in the United States; the methods of assessment and collection, and the remedies open to the individual against arbitrary, unjust, and illegal taxation.

Public Law 19—*The Law of Municipal Corporations*. Professor GOODNOW

One hour a week

This course treats of the creation of municipal corporations ; their relations to the central state government ; their organization and powers ; and their liabilities. Special attention is directed to the law of the United States, but where it seems desirable American conditions are compared with those obtaining in England and on the Continent of Europe

Public Law 20—*Seminar in Administrative Law*. Professor GOODNOW
One hour a week

Subject D—Roman Law and Comparative Jurisprudence

Jurisprudence 21—*Roman Law I*. Professor MUNROE SMITH *

Two hours a week, first half-year (1900-01)

The history and institutions of the classical and Justinian law. Lectures, with assigned reading (Muirhead, *Historical Introduction to the Private Law of Rome* ; Sohm, *Institutes of Roman Law*)

Jurisprudence 22—*Roman Law II*. Professor MUNROE SMITH *

Two hours a week, second half-year (1900-01)

Cases from the *Corpus Juris Civilis*, principally in contracts

Jurisprudence 23—*History of European Law*. Professor MUNROE SMITH *

Two hours a week (1900-01)

This course treats (1) of primitive law, with especial reference to the usages and ideas of the Indo-Germanic races ; (2) of early German law, including a comparison of Scandinavian, Anglo-Saxon, and Continental German customs ; (3) of mediæval European law, including feudal and canon law ; (4) of the "reception" of the Roman law ; and (5) of the genesis and character of the great modern codes

Jurisprudence 24—*Comparative Jurisprudence*. Professor MUNROE SMITH *

Two hours a week (1901-02)

This course, based mainly on a comparison of the modern Roman and the English common law, aims to present the leading principles of modern property law and family law

Jurisprudence 25—*International Private Law*. Professor MUNROE SMITH *

One hour a week (1900-01)

In this course the theories of the foreign authorities and the practice of the foreign courts in the so-called "conflicts of law" are compared with the solution given to these questions by our courts

Jurisprudence 29—*Seminar in Legal History and Comparative Legislation*. Professor MUNROE SMITH *

One hour a week, (1900-01)

GROUP III—ECONOMICS AND SOCIAL SCIENCE

Courses 5, 7, 8, 9, 10, 14, 17, 18, 19, 20, 21, 22, 23, 24, 29, and 30 are open to women having the bachelor's degree on the same terms as to men

* Absent on leave. These lectures will not be given in 1899-1900.

It is presumed that students before entering the school have studied the general principles of political economy as laid down in the ordinary manuals, and possess some knowledge of the facts of economic history. Students who are not thus prepared are recommended to take the following courses in Columbia College*:

The university courses fall under two subjects; **A. Political Economy and Finance.** **B. Sociology and Statistics.**

Courses 3, 4, 11, 12, 15, and 16 are open to Seniors in Columbia College and count towards the degree of A. B. If taken for the higher degrees, such additional work must be done in connection with them as may be prescribed by the instructor.

Subject A—Political Economy and Finance

Economics 3—*Practical Political Economy.* Professor MAYO-SMITH

This course is divided into four sections as follows:

(a) *Problems of Modern Industry.* This part of the course is devoted to a special study of the modern industrial organization and of the application of economic principles to social life. The principal topics are: The scope, method, and function of political economy; the physical environment; law of population; economic freedom and private property; theory and problems of consumption; theory and problems of production, land-tenure, labor, and machinery, the growth of capital; forms of productive enterprise, the concentration of industry; monopolies and trusts; speculation, commercial crises; effects of modern methods of production on producer and consumer

Three hours a week, first half-year

(b) *The Problems of Exchange.* (Money and Trade.) This course is devoted to a study of the mechanism of exchange with special reference to modern currency and commercial questions. The principal topics are: Value and prices; money, bimetalism, the silver question in the United States; credit, banking, paper money, international exchange; free-trade and protection, transportation and commerce. Professor MAYO-SMITH

Three hours a week, second half-year † (1899-1900)

* The lettered course is required of all candidates for A.B. in Columbia College.

Economics 1—*Economic History of England and America*—Professor SELIGMAN and Mr. DAY

Three hours a week, first half-year

This course studies primarily the economic history of England, as affording the clearest picture of the evolution of economic life from primitive society to the complicated mechanism of modern industrial life. Incidentally a comparison is made with the contemporary movements in other European countries. Beginning with the seventeenth century, attention is directed to the facts of American economic development, and the last part of the course is devoted exclusively to the study of the economic and social conditions underlying the history of the United States.

Economics A—*Outlines of Economics.* Professor MAYO-SMITH and Mr. DAY

Three hours a week, second half-year

Bullock's introduction to the study of economics, and lectures on the evolution of the modern economic organization, the principle of economic freedom, and the institution of private property.

† For students desiring to take (a), (b), and (c) in one year a short résumé of the omitted course (b) or (c) will be given.

(c) *The Problems of Distribution.* (Labor and Capital.) This course is devoted largely to the labor question. The principal topics are: The theory of distribution, history and present condition of the laboring class, wages, trades unions and strikes, arbitration and conciliation, co-operation and profit-sharing; factory laws, employer's liability; interest, profit, and rent; social distribution; distributive justice. Professor MAYO-SMITH

Three hours a week, second half-year (1900-1901) alternates with above *

(d) *Readings in Marshall's Principles of Economics.* This course constitutes a fourth hour in connection with the lectures under (a), (b), and (c). It is open to candidates for A.B. by special permission, but the hour cannot be counted towards that degree. It, or its equivalent, is required of all candidates for the degrees of A.M. and Ph.D., taking Economics 3 as a major or minor. Professor MAYO-SMITH

One hour a week

Economics 4—*Science of Finance.* Professor SELIGMAN

Two hours a week

This course is historical, as well as comparative and critical. After giving a general introduction and tracing the history of the science, it treats of the various rules of public expenditures and the methods of meeting the same among different civilized nations. It describes the different kinds of public revenues, including the public domain and public property, public works and industrial undertakings, special assessments, fees, and taxes. It is in great part a course on the history, theories and methods of taxation in all civilized countries. It considers also public debt, methods of borrowing, redemption, refunding, repudiation, etc. Finally, it describes the fiscal organization of the state by which the revenue is collected and expended, and discusses the budget, national, state and local. Although the course is comparative, the point of view is American. Students are furnished with the current public documents of the United States Treasury, and the chief financial reports of the leading commonwealths, and are expected to understand all the facts in regard to public debt, revenue, and expenditure contained therein

Economics 5—*Fiscal and Industrial History of the United States.* Professor SELIGMAN

Two hours a week, first half-year

This course endeavors to present a survey of national legislation on currency, finance and taxation, including the tariff, together with its relations to the state of industry and commerce. Attention is called to the fiscal and industrial conditions of the colonies; to the financial methods of the revolution and the confederation; to the genesis of the protective idea; to the fiscal policies of the Federalists and of the Republicans; to the financial management of the war of 1812; to the industrial effects of the restrictive and war periods; to the crises of 1819, 1825 and 1837; to the tariffs of 1816, 1824 and 1828; to the distribution of the surplus and the Bank war; to the compromise tariff and its effect on industry; to the currency problems before 1863; to the era of "free trade,"

* See second note on preceding page.

and the tariffs of 1846 and 1857; to the fiscal problems of the civil war; to the methods of resumption, conversion and payment of the debt; to the disappearance of the war taxes; to the continuance of the war tariffs; to the money question and the acts of 1878 and 1890; to the loans of 1894-1896; to the tariffs of 1890, 1894 and 1897. The course closes with a discussion of the current problems of currency and coinage, and with a general consideration of the arguments for and against protection as illustrated by the practical operations of the various tariffs

Economics 7—*Railroad Problems; Economic, Social and Legal.* Professor SELIGMAN

Two hours a week, second half-year

These lectures treat of railroads in the fourfold aspect of their relation to the investors, the employees, the public and the state respectively. A history of railways and railway policy in America and Europe forms the preliminary part of the course. The chief problems of railway management, so far as they are of economic importance, come up for discussion

Among the subjects treated are: Financial methods, railway construction, speculation, profits, failures, accounts and reports, expenses, tariffs, principles of rates, classification and discrimination, competition and pooling, accidents, and employers' liability. Especial attention is paid to the methods of regulation and legislation in the United States as compared with European methods, and the course closes with a general discussion of state *versus* private management

Economics 8—*History of Economics.* Professor SELIGMAN

Two hours a week (1900-1901)

In this course the various systems of political economy are discussed in their historical development. The chief exponents of the different schools are taken up in their order, and especial attention is directed to the wider aspects of the connection between the theories and the organization of the existing industrial society. The chief writers discussed are:

I *Antiquity*: The Oriental Codes; Plato, Aristotle, Xenophon, Cato, Seneca, Cicero, the Agrarians, the Jurists

II *Middle Ages*: The Church Fathers, Aquinas, the Glossators, the writers on money, trade, and usury

III *Mercantilists*: Hales, Mun, Petty, Barbon, North, Locke; Bodin, Vauban, Boisguillebert, Forbonnais; Serra, Galiani; Justi, Sonnenfels

IV *Physiocrats*: Quesnay, Gournay, Turgot, Mirabeau, etc.

V *Adam Smith and precursors*: Tucker, Hume, Cantillon, Stewart

VI *English school*: Malthus, Ricardo, Senior, McCulloch, Chalmers, Jones, Mill

VII *The Continent*: Say, Sismondi, Cournot, Bastiat; Herrmann, List, von Thünen

VIII *German historical school*: Roscher, Knies, Hildebrand

IX *Recent Development—England*: Rogers, Jevons, Cairnes, Bagehot, Leslie, Toynbee, Marshall; *Germany*: Wagner, Schmoller, Held, Brentano, Cohn, Schäffle; *Austria*: Menger, Sax, Böhm-Bawerk, Wieser; *France*: Leroy-Beaulieu, Laveleye, Gide, Walras; *Italy*: Cossa, Loria, Pantaleoni; *America*: Carey, George, Walker, Clark, Patten, Adams

Economics 9—*Economic Theory I*. Professor CLARK

Two hours a week, first half-year

This course discusses the static laws of distribution. If the processes of industry were not changing, wages and industry would tend to adjust themselves according to certain standards. A study of the mechanism of production would then show that one part of the product is specifically attributable to labor, and that another part is imputable to capital. It is the object of the course to show that the tendency of free competition, under such conditions, is to give to labor, in the form of wages, the amount that it specifically creates, and also to give to capital, in the form of interest, what it specifically produces. The theory undertakes to prove that the earnings of labor and of capital are governed by a principle of final productivity, and that this principle must be studied on a social scale, rather than in any one department of production

Economics 10—*Economic Theory II*. Professor CLARK

Two hours a week, second half-year

This course discusses the dynamic laws of distribution. The processes of industry are actually progressing. Mechanical invention, emigration, and other influences cause capital and labor to be applied in new ways and with enlarging results. These influences do not repress the action of the static forces of distribution, but they bring a new set of forces into action. They create, first, employers' profits, and, later, additions to wages and interest. It is the object of the course to show how industrial progress affects the several shares in distribution under a system of competition, and also to determine whether the consolidations of labor and capital, which are a distinctive feature of modern industry, have the effect of repressing competition

Economics 11—*Communitistic and Socialistic Theories*. Professor CLARK

Two hours a week, first half-year

This course studies the theories of St. Simon, Fourier, Proudhon, Rodbertus, Marx, Lassalle, and others. It aims to utilize recent discoveries in economic science in making a critical test of these theories themselves and of certain counter-arguments. It examines the socialistic ideals of distribution, and the effects that, by reason of natural laws, would follow an attempt to realize them through the action of the State

Economics 12—*Theories of Social Reform*. Professor CLARK

Two hours a week, second half-year

This course treats of certain plans for the partial reconstruction of industrial society that have been advocated in the United States, and endeavors to determine what reforms are in harmony with economic principles. It treats of the

proposed single tax, of the measures advocated by the Farmers' Alliance and of those proposed by labor organizations, and the general relation of the State to industry

Economics 14—*Seminar in Political Economy and Finance*. Professors SELIGMAN and CLARK

For advanced students. Two hours, bi-weekly

Subject B—Sociology and Statistics

Sociology 15—*Principles of Sociology*. Professor GIDDINGS

Two hours a week

This is a fundamental course, intended to lay a foundation for advanced work. In connection with a text-book study of theory, lectures are given on the sociological systems of Aristotle, Hegel, Comte, Spencer, Schäffle, DeGreef, Gumplowicz, Ward, Tarde, and other writers. Students are required to analyze and classify sociological material of live interest obtained from newspapers, reviews, and official reports

Sociology 16—*Racial demography*. Dr. RIPLEY

Being an analysis of population on the basis of physical anthropology; comparing racial phenomena with those of a sociological character. It is primarily concerned with the anthropology and ethnology of the civilized peoples of Europe. It is intended to subserve three purposes, viz., as an introduction to advanced statistical and demographic research; secondly, as an outline of the racial and cultural history of Europe during the prehistoric period; and, thirdly, as an essay in social geography

Two hours a week, second half-year. Dr. RIPLEY

Sociology 17—*Statistics and Sociology*. Professor MAYO-SMITH

Two hours a week, first half-year

This course is given every year and is intended to train students in the use of statistics as an instrument of investigation in social science. The topics covered are: Relation of statistics to sociology, criteria of statistics, population, population and land, sex, age, and conjugal condition, births, marriages, deaths, sickness and mortality, race and nationality, migration, social position, infirmities, suicide, vice, crime, nature of statistical regularities

Sociology 18—*Statistics and Economics*. Professor MAYO-SMITH

Two hours a week, second half-year, given in 1900-1901, and each alternate year

This course covers those statistics of most use in political economy, but which have also a direct bearing on the problems of sociology. These include the statistics of land, production of food, condition of labor, wages, money, credit, prices, commerce, manufactures, trade, imports and exports, national wealth, public debt, and relative incomes

Sociology 19—*Theory, Technique, and History of Statistical Science*. Professor MAYO-SMITH

Two hours a week, second half-year, given in 1899-1900, and each alternate year

This course studies the theory of statistics, averages, mean error, law of probabilities, rules for collecting, tabulating, and presenting statistics, graphical methods, the value of the results obtained by the statistical method, the possibility of discovering social laws. Some account will also be given of the history and literature of statistics, and the organization of statistical bureaus

Sociology 20—*Social Evolution*. Professor GIDDINGS

Two hours a week, first half-year

The advanced study of general Sociology is begun in this course. It includes three parts, namely: (1) a brief preliminary account of the scientific position, scope, concepts, problems, methods, and empirical laws of Sociology; (2) a study of origins and early history of society, with special attention to the early forms and later development of the family, to the origin, structure, and functions of the clan, to the organization of the tribe, and to the rise of tribal federation; (3) a study of the origin, establishment, and nature of civilization, with special attention to the influence of ethnic elements, to developments of social feeling and prevailing beliefs, to the policies by which civilization has been extended, and to the conditions that have produced arrested civilizations

Sociology 21—*Progress and Democracy*. Professor GIDDINGS

Two hours a week; second half-year

The phenomena of progressive as distinguished from stationary civilizations are the subject of this course, which includes three parts, namely: (1) a study of the causes and nature of progress, with special attention to the rise of discussion, to the growth of public opinion, and to the policies by which continuing progress is assured; (2) a study of the nature and social organization of modern democracies and the extent to which non-political associations, as business corporations, labor unions, churches, and associations for culture and pleasure are more or less democratic, with special attention to the dangers of democracy, including the causes of emotional epidemics, panics, and outbreaks of mob violence, to the rise of an ethical consciousness, and of philanthropic endeavor, and to the democratic ideals of equality and fraternity in their relations to social order and liberty; (3) a study of the conditions and laws of social survival, with special attention to the influences of character, occupation, mental and social activity, that are shaping the destinies of the American people

Sociology 22—*Pauperism, Poor Laws, and Charities*. Professor GIDDINGS

Two hours a week, first half-year

This course begins with a study of the English poor law, its history, practical working, and consequences. On this foundation is built a study of pauperism in general, but especially as it may now be observed in great cities. The laws of the different commonwealths in regard to paupers, out-relief, alms-houses, and dependent children, are compared. Finally the special modern methods of public and private philanthropy are considered, with particular attention to charity organization, the restriction of outdoor alms, and the reclamation of children

Sociology 23—*Crime and Penology*. Professor GIDDINGS

Two hours a week, second half-year

The topics taken up in this course are the nature and definitions of crime, the increase of crime and its modern forms, criminal anthropology, the social causes of crime, surroundings, parental neglect, education, the question of responsibility, historical methods of punishment, the history of efforts to reform prison methods, modern methods, the solitary system, the Elmira system, classification of criminals, classes of prisons, reformatories, and jails

Sociology 24—*The Civil Aspects of Ecclesiastical Organizations*. Dr. BAYLES

One hour a week

The purpose of this course is to define the present relations of the ecclesiastical institutes to the other institutes of American society; the state, the government, marriage, family, education, and public wealth. An analysis is made of the guarantees of religious liberty contained in the federal and commonwealth constitutions, of the civil status of churches in terms of constitutional and statute law, of the methods of incorporation, of the functions of trustees, of legislative and judicial control, of denominational polity according to its type, of the functional activity of churches in their departments of legislation, administration, adjudication, discipline, and mission, of the influence of churches on ethical standards, of the distribution of the nationalities among the denominations, of the territorial distribution of denominational strength, of the relation of polity to density of population and of the current movements in and between various organizations tending toward changes of function and structure

Sociology 29—*Laboratory Work in Statistics*. Professor MAYO-SMITH

In connection with courses 17, 18, and 19. Two hours bi-weekly (same hour as Seminar in Sociology on alternate weeks)

The object of the laboratory is to train the student in methods of statistical analysis and computation. Each student will pursue a course of laboratory practice dealing with the general statistics of population, the relation of classes, the distribution of wealth, and the statistics of crime, vice, and misfortune. He will be taught how to judge current statistics and to detect statistical fallacies; in short, to become an expert in judging of the value of sociological evidence. Each year some practical piece of work on an extensive scale is undertaken by the class

Sociology 30—*Seminar in Sociology*

Two hours, bi-weekly. Professor GIDDINGS

Discussions and papers, theses, and dissertations presented in the seminar may be upon any of the following topics:

I

POPULATION

- 1 The growth of population in the United States, including studies of birth rates and death rates.
- 2 Immigration into the United States.
- 3 The migration of population within the United States.

II

RACES AND NATIONALITIES

- 4 The social traits, habits, and organization of any race (*e. g.*, negro or Indian) in the United States.
- 5 The social traits, habits, and organization of any nationality (*e. g.*, Irish or German or Italian) in the United States.

III

THE FAMILY

- 6 Historical or statistical studies of marriage, of divorce, or of the parental care and education of children in the United States.
- 7 Studies of legislation affecting the family in the United States.

IV

COMMUNITIES

- 8 Descriptive or historical studies of peculiar, exceptional, or otherwise noteworthy communities or sections.

V

THE SOCIAL LIFE AND ORGANIZATION OF THE SELF-SUPPORTING POOR

- 9 Dwellings and surroundings.
- 10 Expenditure and domestic economy.
- 11 Marriages, domestic festivals, funerals, family life, and morals.
- 12 Education.
- 13 Religious ideas, habits, meetings, festivals, and institutions.
- 14 Amusements, celebrations, social festivals, and clubs.
- 15 Trade unions.
- 16 Political and legal ideas, affiliations and activities.

VI

PAUPERISM AND CHARITY

- 17 Historical studies of the origin, growth, and forms of pauperism.
- 18 Statistical studies of the extent and causes of pauperism.
- 19 Historical and comparative studies of poor laws and public relief.
- 20 Historical and comparative studies of the methods of private charity.

VII

CRIME AND PUNISHMENT

- 21 Historical studies of the origin, increase, and forms of crime.
- 22 Statistical studies of the extent and cause of crime.
- 23 Critical studies of criminal anthropology or criminal sociology.
- 24 Historical and comparative studies of punishment and reformation.

ORDER OF STUDIES

The following courses are open to Seniors in Columbia College :

- | | |
|---------------|--|
| History 6. | History of England in the 18th and 19th Centuries. |
| History 7. | Political and Constitutional History of Rome. |
| History 11. | Introduction to Modern European History. |
| History 14a. | Antecedents and opening of the French Revolution. |
| History 14b. | The Age of the Revolution, 1791-1815. |
| History 16. | Constitutional History of England to 1689. |
| History 30. | Transitions in American History. |
| History 31. | Constitutional History of the United States. |
| History 40. | History of Political Theories. |
| Economics 3. | Practical Political Economy. |
| Economics 4. | Science of Finance. |
| Economics 11. | Communistic and Socialistic Theories. |
| Economics 12. | Theories of Social Reform. |
| Sociology 15. | Principles of Sociology. |
| Sociology 16. | Racial Demography. |

ACADEMY OF POLITICAL SCIENCE

This institution, which holds its meetings at Columbia University, is devoted to the cultivation and advancement of the political sciences. It consists of Fellows, Associates, and Student Members. No person is eligible as Fellow unless he has contributed to the development of the political sciences or aided in their application to the problems of the time. The number of Fellows is restricted to one hundred—any person who is in sympathy with the work of the academy is eligible to membership as an associate. Students are eligible also to membership as student members.

Meetings of the academy are held each month. At these meetings papers are read by members, presenting the results of original investigation by the writers in some department of political science.

FACULTY OF PHILOSOPHY

The various departments mentioned below issue special circulars describing in detail the courses to be given, the departmental equipment, and the other facilities which they offer to students. Applications for such circulars should be made to the Secretary of the University.

Women who wish to enter any of the courses announced as open to them, as special students or as candidates for a degree, must register at Barnard College or at Teachers College.

In the following, the term "university students" is used to designate students registered under one of the Faculties of Philosophy, Political Science, or Pure Science, or under one of the professional Faculties of Law, Medicine, or Applied Science.

When candidates for the degree of Master of Arts or Doctor of Philosophy are permitted to offer, as part of the requirement for those degrees, work done at the Union Theological Seminary in Semitic Languages or in Greek, a record of the additional work assigned, approved by the head of the appropriate department in Columbia University, must be filed in the office of the Dean immediately after the candidate's registration is completed. The examinations on all such work, including that done at the Union Seminary in the subject chosen, will be conducted at Columbia University by officers designated for the purpose by the President.

PHILOSOPHY, EDUCATION, PSYCHOLOGY, AND ANTHROPOLOGY

The courses of these departments fall into four groups: those on philosophy, those on psychology, those on anthropology, and those on education. In each group are courses best described as introductory, the aim of which is to furnish a general acquaintance with the main subdivisions of philosophy, psychology, and education as a whole. The courses known as Philosophy 1 and 2; Psychology A, 1, 2, and 8; Anthropology 1 and 2; and Education 1, 2, and 3 are of this character. By the use of the historical and comparative methods of study and exposition, students in these courses are introduced to a general survey of their respective subjects.

The courses regularly open to Seniors in Columbia College are: Philosophy 1, 2, 7, and 8; Psychology 1, 2, 3, 8, 9, and 10; Anthropology 1 and 2; and all the courses in Education, except the Seminars. None of these courses will therefore be credited toward the degrees of Master of Arts and Doctor of Philosophy unless additional work be taken in connection therewith.

All the courses are open to university students.

All the courses offered by these departments, except Psychology A and 7, and Anthropology 3, are open to women on the same terms as to men.

All the courses are open to auditors, except Psychology A and 7, Anthropology 3, the several Seminars, and research work.

Courses in Philosophy

1—Historical and Critical Introduction to Philosophy: Weber's *History of Philosophy*, Windelband's *History of Philosophy*, K  t  lpe's *Introduction to Philosophy*, Paulsen's *Introduction to Philosophy*. Lectures, discussions, and private reading. Three hours weekly. Professor BUTLER, assisted by Dr. MARVIN M., W., and F. at 2.30, Room 422, Library

2—Ethics, Introductory Course: Hyslop's *Elements of Ethics*. Lectures, essays, and discussions. Professor HYSLOP
Tu. and Th. at 2.30, Room 417, Library

3—The Philosophy of Kant and his Successors: Fichte, Schelling, Hegel, Herbart, and Schopenhauer. Lectures, essays, and private reading. Professor BUTLER, assisted by Dr. MARVIN
M. and W. at 3.30, Room 415, Library

[4—British Philosophy from Locke to Herbert Spencer: History and criticism of the association psychology and the philosophy of evolution. Locke's *Essay on the Human Understanding*, Berkeley's *Principles of Human Knowledge*, Hume's *Treatise of Human Nature*: the writings of Hartley, Brown, the Mills, and Bain: Herbert Spencer's *First Principles*. Lectures, essays, and private reading. Professor BUTLER, assisted by Dr. MARVIN

Not given in 1899-1900]

Courses 3 and 4 are given in alternate years

[5—Practical Ethics: Lectures, essays, observations, and discussions. Professor HYSLOP

Not given in 1899-1900]

6—Epistemology: Lectures, discussions, and essays. Professor HYSLOP

Tu. and Th. at 3.30, Room 417, Library

Courses 5 and 6 are given in alternate years

7—History of Ethics: Lectures, private reading, essays, and discussions. Dr. JONES

Tu. and Th. at 1.30, Room 421, Library

8—Principles and Problems of A  sthetics: Lectures, discussions, and private reading. Dr. JONES

M. and W. at 11.30, Room 421, Library

9—Applied Logic and Scientific Method: Lectures and discussions. Professor HYSLOP, assisted by Dr. JONES

M., W., and F. at 1.30, second half-year, Room 417, Library

10—Journal Club: Reports and discussions on current philosophical literature. Dr. MARVIN

Hour to be arranged

11—Studies in European Philosophy from the Renascence to the Enlightenment: Lectures and essays. Dr. MARVIN

M. and W. at 1.30, Room 421, Library

12—Philosophical Practicum on Aristotle's *De Anima* and *Metaphysics*. Dr. MARVIN

F., 3.30–5.30, Room 421, Library

See also announcement of Classical Seminar, Greek Section, p. 55

Seminars

Philosophical Seminar. Professor BUTLER

Subject for 1899–1900: Topics in the History of Psychology

Hour to be arranged

Ethical Seminar. Professor HYSLOP

Subject for 1899–1900: Topics in Ethical Theory

Hour to be arranged

Courses in Psychology

A—Elements of Psychology: Hyslop's *Syllabus of Psychology*, James's *Psychology*. Lectures, practical exercises, and recitations. Professor HYSLOP, assisted by Dr. JONES

M., W., and F. at 1.30, first half-year, Room 422, Library

Course **A** may not be counted towards the degree of Master of Arts or Doctor of Philosophy. A parallel course is given at the Teachers College by Dr. THORNDIKE

1—Introduction to Psychology: Lectures and demonstrations. Professors BUTLER, CATTELL, STARR, BOAS, and HYSLOP, Dr. FARRAND, and Mr. STRONG

Tu. and Th. at 11.30, psychological laboratory

A. Prolegomena to psychology, including a sketch of its history and relations to philosophy and to the other sciences. Six lectures. Professor BUTLER

B. Experimental psychology; laboratory methods. Eight lectures. Professor CATTELL

C. Genetic psychology. Seven lectures. Dr. THORNDIKE

D. Racial and individual psychology. Seven lectures. Professor BOAS

E. Pathological psychology. Three lectures. Professor STARR

F. General psychology. Eight lectures. Professor HYSLOP

G. Philosophy of mind. Six Lectures. Mr. STRONG

2—Experimental Psychology, Introductory Course: Lectures, themes, and laboratory work. Professor CATTELL

Tu. and Th. at 10.30, psychological laboratory

3—Experimental Psychology: Laboratory work. Two or four hours weekly, counting as a one- or two-hours course. Professor CATTELL, assisted by Mr. FRANZ

Tu. and Th. at 9.30, 1.30–3.30, and Sat., 9.30–11.30, psychological laboratory

4—The Methods of Experimental Psychology: Lectures, laboratory work, and reports. Professor CATTELL

Tu. and Th. at 12.30, psychological laboratory

5—Research Work in Experimental Psychology. Professor CATTELL, assisted by Mr. FRANZ

6—General Psychology, Advanced Course : Lectures and discussions. Mr. STRONG. Two hours

7—Diseases of the Mind and Nervous System : Lectures and demonstrations. Professor STARR

Th., 4-5, College of Physicians and Surgeons

8—Physiological Psychology, General Course : Lectures, demonstrations, and laboratory work. Dr. FARRAND

M., W., and F. at 10.30, psychological laboratory

9—Abnormal and Pathological Psychology : Lectures and discussions. Dr. FARRAND

F. at 12.30, second half-year, psychological laboratory

10—Experimental Psychology, with reference to its applications in education. Mr. FRANZ

Sat. at 11.30, psychological laboratory

11—Genetic Psychology, Advanced Course. Dr. THORNDIKE

Tu. and Th. at 2.30, Teachers College

12—Research Work in Physiological and Abnormal Psychology and in Ethnology ; Consultations. Dr. FARRAND

At hours to be arranged, psychological laboratory

Courses in Anthropology

1—Anthropology, General Introductory Course : Lectures, essays and discussions. First term : Physical Anthropology and Linguistics. Professor BOAS. Second term : Ethnology. Dr. FARRAND

Tu. and Th. at 1.30, psychological laboratory

2—The Statistical Study of Variation, Introductory Course : Lectures, essays, and discussions. Professor BOAS

Tu. and Th. at 9.30, psychological laboratory

3—Ethnology, Primitive Culture : Lectures, papers, and discussion. Dr. FARRAND

M. and W. at 12.30, psychological laboratory

4—Physical Anthropology : Lectures and laboratory work. Professor BOAS
W. 9.30-11.50, American Museum of Natural History

5—Physical Anthropology, Research Work. Professor BOAS
Daily, American Museum of Natural History

6—North American Languages : Lectures and discussions. Professor BOAS
Tu. 10.30-12.30, psychological laboratory

Courses in Education

History and Philosophy of Education

1—History of education. Lectures, essays, and discussions. Two hours weekly throughout the year. Two sections. Professor MONROE

A : M. and W. at 11.30 ; B : M. and W. at 3.30.

2—Principles of Education. Lectures, essays, required reading, and discussions. Two hours weekly throughout the year. Professor BUTLER

Tu. and Th. at 3.30, Room 407 Schermerhorn

[8—Secondary Education. The historical development of secondary schools in Europe and America ; the purpose and means of secondary education ; the correlation of studies and the pedagogical problems involved in secondary education. Lectures and discussions based on supplementary reading. Two hours weekly throughout the year. Professor RUSSELL

Tu. and Th. at 4.30

Given in 1900-01, and in alternate years thereafter.]

SEMINAR 2—The Development of the Secondary School in Europe and America. Two sessions monthly throughout the year. Professor RUSSELL and Professor MONROE

W. at 4.30

Open only to graduate students who are qualified to undertake research and investigation.

School Economy and Child Study

6—School Supervision and Management. The practical problems of school economy. Lectures, essays, and discussions. One session weekly throughout the year, counting as a one-hour or a two-hour course. Superintendent GILBERT

W., 4.30-6

7—Comparative Study of Educational Systems. The national systems of Germany, France, and England compared with our own ; free and compulsory education ; administration and supervision ; training of teachers ; appointment ; salaries and pensions ; school curricula ; methods of teaching ; relations of elementary, secondary, and higher education. Lectures and supplementary reading. Two hours weekly throughout the year. Professor RUSSELL

Tu. and Th. at 4.30

Given in 1899-1900, and in alternate years thereafter.

9—Child-study. Physical and mental development of the child. Observation, experiments, private reading, and conferences. Two hours weekly throughout the year. Dr. THORNDIKE

Tu. and Th. at 11.30

Open to students who are taking, or have completed, Psychology A and Education 3

27—School Hygiene. The principles of hygiene applied to the physical and mental conditions of school work. Lectures, experimental study, and discussion. Three hours weekly during the second half-year. Dr. THORNDIKE

M., W., and F. at 3.30

SEMINAR 1—Administration of public education in the United States. One session weekly throughout the year. Professor BUTLER

Hour to be arranged to meet the convenience of students

Columbia Library, Room 421

Open only to graduate students who are qualified to undertake research and investigation

Theory and Practice of Teaching

3—Applications of Psychology in Teaching. Discussions, critical study of texts, and collateral reading. Three hours during one half-year. Three sections. Mr. REEDER

A First half-year. M., W., and F. at 3.30

B Second half-year. M., W., and F. at 11.30

C Second half-year. M., W., and F. at 10.45

This course is prerequisite to Education **4** and all practice in teaching, Psychology **A** or its equivalent is a prerequisite for this course

4—Observation and Practice in Teaching.

A Observation. Weekly conferences following observation of recitations. Also preparation of lesson-plans and critical study of elementary school textbooks. Two hours weekly throughout the year. Either half-year may be taken separately. Professor McMURRY and Mr. REEDER

Tu., 1.30-3.30

B Teaching. Practice in teaching under supervision. Study and hours to be arranged. Professor McMURRY, Mr. REEDER, Miss WOHLFARTH, and the heads of departments concerned

Open only to students who have completed Psychology **A** and Education **3**

5—General Method. The ends of education, the means for their attainment, the relative worth of studies, correlation and interest. Lectures, critical study of texts, and discussions. Two hours throughout the year. Professor McMURRY

Tu. and Th. at 11.30

This course supplements Education **2** and **3**, and may profitably be taken with them

10—Primary Teaching. The general and specific aims, the course of study, correlation, methods of instruction in each subject of the primary school. Observation, discussions, and lectures. Two hours weekly throughout the year. Professor McMURRY

Tu. and Th. at 4.30

SEMINAR 3—The Curriculum of the Elementary School. The outline of study in each common-school subject will be determined by careful examination of the published curricula of the best schools of the country, by consultation with the heads of departments in the college, and by extensive discussion. One session weekly throughout the year. Professor McMURRY and Mr. REEDER

W., 9.15-10.45

Open as an elective to graduate students who are qualified to undertake research and investigation

26—Drawing and Manual Training for the Primary Grades. Drawing and manual training as expression-subjects; correlation with other studies. Con-

ferences, preparation of lessons, observation, and practical work. Professors CHURCHILL, RICHARDS, and WOOLMAN

M. and F. at 1.30

11—Principles and Methods of Art-Teaching in Elementary and Secondary Schools. Class work, with lectures, conferences, and observation. Three hours weekly throughout the year, counting as a two-hours course. Professor CHURCHILL and Mrs. CHAMBERS

M. and F., 1.30

12—Methods of Teaching Biology in Elementary and Secondary Schools. Lectures, laboratory, and field work. Three hours weekly throughout the year, counting as a two-hours course. Professor LLOYD

W., 9.15–11.30

13—Methods of Teaching English in Secondary Schools. Lectures, discussions, reports of observation, and practice teaching. Three hours weekly throughout the year, counting as a two-hours course. Professor BAKER

Tu. and Th. at 9.30

14—Methods of Teaching English in Elementary Schools. Lectures, discussions, reports of observation, and practice teaching. Three hours weekly during the first half-year. Professor BAKER

M., W., and F. at 1.30

[15—Methods of Teaching French in Secondary Schools

Not given in 1899–1900.]

16a—Methods of Teaching Geography and Geology in Secondary Schools. Lectures, discussions, and preparation for practice teaching. Three hours weekly throughout the year, counting as a two-hours course. Professor DODGE

M. at 9.30, and other hours to be arranged.

16b—Methods of Teaching Geography in Elementary Schools. Lectures, discussions, and preparation for practice teaching. Three hours weekly throughout the year, counting as a two-hours course. Geikie, *The Teaching of Geography*. Professor DODGE and Miss LUDDINGTON

Open as an elective to qualified students

W. at 10.45, and other hours to be arranged

17—Methods of Teaching German in Secondary Schools. Essays, discussions, reports of observation, and practice teaching. Three hours weekly during the second half-year, counting with German **19** as a two-hours course. Mr. BAGSTER-COLLINS

Hours to be arranged to meet the convenience of students

18—Methods of Teaching Greek in secondary schools. Essays, discussions, reports of observation, and practice teaching. Three hours weekly during the second half-year, counting with Methods of Classical Instruction (Greek **25** and Latin **25**) as a two-hours course. Miss COCHRAN

Hours to be arranged to meet the convenience of students

19—Methods of Teaching History in Secondary Schools. Lectures, essays, discussions, reports of observation, and practice-teaching. Three hours weekly throughout the year, counting as a two-hours course. Professor CASTLE

Tu. and Th. at 11.30

20—Methods of Teaching History in Elementary Schools. Lectures, conferences, reference-work, observation, and practice-teaching. Two hours weekly during the first half-year. Professor CASTLE

W. at 10, and an hour for observation to be arranged

21—Methods of Teaching Latin in Secondary Schools. Essays, discussions, reports of observation, and practice-teaching. Three hours weekly during the second half-year, counting with Methods of Classical Instruction (Greek **25** and Latin **25**) as a two-hours course. Mr. C. M. BAKER

Hours to be arranged to meet the convenience of students

22a—Principles and Methods of Teaching Manual Training. Lectures, conferences, and reports on reading. Three hours weekly throughout the year, counting as a two-hours course. Professor RICHARDS

Tu. at 11.30, and F. at 3.30

22b—Organization and Supervision of Manual Training. Lectures, conferences, reports on reading and observation. Two hours weekly throughout the year. Professor RICHARDS

M. and W. at 11.30

23—Methods of Teaching Mathematics in Secondary Schools. Lectures, discussions, and practical work. Three hours weekly throughout the year, counting as a two-hours course. Professor BIKLÉ

Tu. and Th. at 1.30

24—Methods of Teaching Mathematics in Elementary Schools. Lectures, discussions, and practical work. Three hours weekly during the second half-year. Professor BIKLÉ

M., W., and F., at 1.30

25—Methods of Teaching Physical Science in Elementary and Secondary Schools. Chemistry, first half-year; physics, second half-year. Lectures, discussions, and practical work. Three hours weekly throughout the year, counting as a two-hours course. Professor WOODHULL

M. at 2.30, and F., 2.30-4.30

NOTE.—Education **11**, **12**, **13**, **14**, **15**, **16**, **17**, **18**, **19**, **21**, **22**, **23**, and **25** are required of candidates for the Teachers College diploma in the several subjects to which they relate. A total of nine hours' credit for courses in subject-matter, selected with the approval of the Dean of Teachers College, must also be secured in each subject offered for the diploma in secondary teaching

SCIENCE OF LANGUAGE

1—Introduction to the Science of Language. Professors JACKSON and GOTTHEIL

M. and W. at 10.30

This course is open to all university students and to Seniors in Columbia Col-

lege. It may not be counted toward the degree of Master of Arts or Doctor of Philosophy except as the basis of special work done in connection with it. It is open to women on the same terms as to men

By agreement between the several philological departments a course of two hours weekly, consisting of lectures and exercises, will be offered every second year under the foregoing title. This course is designed to serve as a preparation for advanced studies in any field of linguistic research, and will, it is believed, prove of especial value to all university students who look forward to such investigations. The course will be taken with most profit by those who have had a good preliminary training in psychology and in the elements of phonetics

RHETORIC AND ENGLISH COMPOSITION

Courses 3 and 7 are open to Seniors in Columbia College, to university students, and to women who are candidates for the degree of Bachelor of Arts

Courses 1, 2, 4, and 6 are open to Seniors of Columbia College and to university students, but not to women

Courses 1, 2, 4, and 6 may not be counted towards the degree of Master of Arts or Doctor of Philosophy

Courses 3 and 7 are open to auditors

Courses

1—English Composition. Lectures, daily themes, and fortnightly essays. Professor G. R. CARPENTER

Tu., Th., and S. at 10.30, first half-year

2—English Composition. Essays, lectures, and discussions in regard to style. Professor G. R. CARPENTER

Tu., Th., and S. at 10.30, second half-year

3—English Composition, Advanced Course. Essays, lectures, and consultations. Dr. ODELL

Tu. and Th. at 10.30

4—Elocution. Lectures and Exercises. Mr. PUTNAM

Tu. and Th. at 1.30

[5—The Art of English Versification. Professor BRANDER MATTHEWS
Not given in 1899-1900]

6—Argumentative Composition. Lectures, briefs, essays, and oral discussions. Mr. —

M., W., and F. at 9.30

7—Seminar. The topics discussed in 1899-1900 will be: Theory of English Usage (first half-year); entrance requirements in English (second half-year). Professor G. R. CARPENTER

S., 11.30-1.30

ENGLISH AND LITERATURE

ENGLISH LANGUAGE AND LITERATURE

Courses 2, 3, 4, 10, 11, 12, 13, 14, 15, 16, and 17 are open to Seniors in Columbia College and to university students. They are intended primarily for candidates for the degree of Bachelor of Arts, and may not be counted alone toward the degree of Master of Arts or Doctor of Philosophy

Courses 5, 6, and 7 are open to graduates only

Courses 5, 6, 7, 8, and 10 are open to women on the same terms as to men, and to auditors

Courses

2—Anglo-Saxon Language and Historical English Grammar. Mr. —
Tu. and Th. at 9.30

3—Anglo-Saxon Literature : Poetry and Prose. Professor PRICE
Tu. and Th. at 11.30

4—Chaucer : Language, Versification, and Method of Narrative Poetry.
Professor PRICE
Tu. and Th. at 12.30

5—English Language and Literature of the Eleventh, Twelfth, and Thirteenth Centuries. Professor PRICE
Two hours. Hours to be arranged

[6—English Language and Literature of the Fourteenth Century, exclusive of Chaucer, and of the Fifteenth Century : Reading of authors, with investigation of special questions and writing of essays. Professor PRICE
Not given in 1899-1900]

[7—English Language and Literature of the Sixteenth Century : Reading of authors, with investigation of special questions and writing of essays. Professor PRICE
Not given in 1899-1900]

Courses 5, 6, and 7 are designed for the careful study of the language and literature of Early and Middle English Periods ; Course 7 was given in 1898-99

[8—Anglo-Saxon Prose and Historical English Syntax. Investigation of special questions and writing of essays. Professor PRICE
Not given in 1899-1900]

[10—English Verse-forms : Study of their historical development. Professor PRICE
Tu. and Th. at 10.30
Not given in 1899-1900]

11—History of English Literature from 1789 to the death of Tennyson
Lectures. Professor WOODBERRY
M., W., and F. at 10.30

[12—History of English Literature from 1660 to 1789 : Lectures. Professor WOODBERRY
M., W., and F. at 12.30
Not given in 1899-1900]

Course 12 is given in alternate years

13—History of English Literature from the birth of Shakspeare to 1660
Lectures. Professor WOODBERRY

M., W., and F. at 12.30

14—Pope : Language, Versification, and Poetical Method. Professor PRICE
M. and W. at 12.30

[15—Shakspeare : Language, Versification, and Method of Dramatic Poetry
Text : Cambridge Text of Shakspeare. Professor PRICE
Not given in 1899-1900]

16—American Literature. Professor BRANDER MATTHEWS (first half-year)
and Professor G. R. CARPENTER (second half-year)
Tu. and Th. at 2.30

17—The Poetry, Lyrical, Narrative, and Dramatic, of Tennyson, Browning,
and Arnold. Professor PRICE
M. and W. at 11.30

LITERATURE

Course 1 is open to Seniors in Columbia College and to university students :
it may not be counted for the degree of A.M. or Ph.D. except when additional
work is taken with it. Course 2 is open to Juniors who have taken English
13, to Seniors, and to university students ; it may not be counted for the
degree of A.M. or Ph.D. Course 7 is open to Seniors who have taken Course
2. Courses 3, 4, 5, 6, 7, 9, 12, 13, 14, 15, and the Seminars are open to
graduates

Courses 7, 9, 12, 13, 14, 15, and the Seminar in Literature are open to
women

Courses 7, 9, 12, 13, 14, and 15 are open to auditors

Courses

[1—The History of Modern Fiction. Professor BRANDER MATTHEWS
Not given in 1899-1900]

[2—The Theory, History, and Practice of Criticism, with special attention to
Aristotle, Boileau, Lessing, and English and later French writers, with a study
of great works of imagination. Professor WOODBERRY
Not given in 1899-1900]

3—Epochs of the Drama : Greek, Latin, Spanish, English, French (to Cor-
neille and Racine). Professor BRANDER MATTHEWS

Tu. and Th. at 1.30, and S. at 10.30, first half-year. Room 502, Fayer-
weather

[4—Dramatists of the Nineteenth Century : French, Scandinavian, German,
English. Professor BRANDER MATTHEWS
Not given in 1899-1900]

Courses 3 and 4 are given in alternate years

5—Molière and Modern Comedy. Professor BRANDER MATTHEWS
Tu. and Th. at 3.30, and S. at 11.30, first half-year. Room 502, Fayer-
weather

[6—The Evolution of the Essay. Professor BRANDER MATTHEWS. One hour weekly

Not given in 1899-1900]

7—Studies in Literature, mainly critical. Selected works, in prose and verse, illustrating the character and development of national literatures. Professor WOODBERRY

M., W., and F. at 2.30

9—History of Lyric Poetry in the Middle Ages and the Renaissance. Mr. SPINGARN. Three hours

12—Elements of Romanticism in English, French, and German Literatures in the Eighteenth Century. Mr. UNDERHILL. Two hours, first half-year

13—Elements of Humanism in Modern Literature. Mr. SPINGARN. One hour

14—The Literary Relations between England and Spain in the Elizabethan Age. Mr. UNDERHILL. Two hours, second half-year

15—The Origin and Development of Allegory in the Middle Ages and the Renaissance. Mr. SPINGARN. Two hours, second half-year

Seminars

Special topics in Literature. Professor WOODBERRY

Hours and subjects for 1899-1900 to be arranged

Special topics in the History of the Drama. Professor BRANDER MATTHEWS
[Not to be held in 1899-1900]

ORIENTAL LANGUAGES

SEMITIC LANGUAGES

Courses 1, 2, 3, 4, 5, 10, 11, 12, 13, 15, 16, and 17, and the Seminar, are open to Seniors in Columbia College and to university students; Courses 6, 7, 8, 9, 14, and 17, to advanced students only; Courses 3, 6, 7, 8, 9, 11, and 16 are open to women on the same terms as to men

All the courses in Semitic languages except the Seminar are open to auditors

Courses in Hebrew

The course in Hebrew extends over three years. The first year is devoted to the study of the elements; the second, to the study of the syntax and the acquiring of ease in translating from Hebrew into English, and from English into Hebrew; the third, to a critical study of one or more books of the Bible

The attention of students in Columbia College is directed to the fact that it is desirable that those who intend entering a theological seminary after graduation shall have had at least two years' previous training in Hebrew. Opportunity for this training is given the students of Columbia College, Hebrew being an elective in both the Junior and Senior classes

1—Biblical Hebrew, Elementary course. Davidson's *Introductory Hebrew Grammar*. Professor GOTTHEIL

Tu. and Th. at 9.30

2—Biblical Hebrew, Second Course. Rapid reading of the Books of Samuel and Kings, in connection with Gesenius' *Hebräische Grammatik* and Driver's *Hebrew Tenses*. Professor GOTTHEIL

Tu. and Th. at 2.30, first half-year

3—Biblical Hebrew, Third Course. Interpretation of the Book of Jeremiah. Professor GOTTHEIL

Tu. and Th. at 2.30, second half-year

4—Rabbinical Hebrew. Selected readings from the Midrashic literature. Professor GOTTHEIL

Tu. and Th. at 10.30, first half-year

5—Rabbinical Hebrew. The recently recovered text of the Book of Ecclesiasticus, with a comparison of the Greek and Syriac versions. Professor GOTTHEIL

Tu. and Th. at 10.30, second half-year

For Courses 4 and 5, a previous knowledge of Biblical Hebrew is demanded

6—Rabbinical Hebrew. Selected readings (in Hebrew and Arabic) from the Jewish philosophical writings of the Middle Ages. Professor GOTTHEIL

Second half-year only; hours to be arranged

Courses in Semitic Epigraphy

7—Interpretation of the Phœnician Inscriptions, with an introduction to Semitic epigraphy. Professor GOTTHEIL

Hours to be arranged

[8—Interpretation of the Aramæan Inscriptions of Sinjirli (*Mittheilungen aus den Orientalischen Sammlungen*, Heft xi, Berlin, 1893), and of the *Corpus Inscriptionum Semiticarum*, vol. i. Professor GOTTHEIL

Not given in 1899-1900. To be given in 1900-1901]

[9—Interpretation of the Sabæan and Himyaritic Inscriptions of the *Corpus Inscriptionum Semiticarum*, vol. ii. Professor GOTTHEIL

Not given in 1899-1900. To be given in 1901-2]

For Courses 7 and 8, which are open to advanced students only, a previous knowledge of Hebrew and Aramæan, respectively, is demanded; for Course 9 a previous knowledge of Arabic

Courses in Assyrian

10—Elementary course. Study of the Syllabary, with readings from selected portions of Abel and Winckler's *Keilschrifttexte zum Gebrauch bei Vorlesungen*, and a study of Delitzsch's *Assyrian Grammar*. Professor GOTTHEIL

M. and W. at 2.30

[11—Advanced Course. The Babylonian accounts of the creation and flood (Paul Haupt, *Das Babylonische Nimrodepos*, and Fr. Delitzsch, *Assyrische Lesestücke*). Assyrian Syllabaries. Professor GOTTHEIL

Not given in 1899-1900. To be given in 1900-1901]

Courses in Arabic

12—Elementary Course. Study of Socin's *Arabic Grammar* with exercises in translating Arabic into English, and English into Arabic. Professor GOTTHEIL

Tu. and Th. at 1.30, first half-year

13—Second Course. Study of Brünnow's *Chrestomathie aus arabischen Prosaschriftstellern*. Professor GOTTHEIL

Tu. and Th. at 1.30, second half-year

14—Third Course. Advanced work. First half-year: Interpretation of the Early Suras of the Koran. Second half-year: Interpretation of Al-Buhārī's collection of traditions

Tu. and Th. at 3.30

Courses in Syriac

15—Elementary Course. First half-year: Nöldeke's *Syrische Grammatik*, in connection with selected readings from the Peshitta. Second half-year: Interpretation of selected portions of the *Acta Martyrum* (ed. Bedjan). Professor GOTTHEIL and Mr. YOHANNAN

M. and W. at 3.30

16—Advanced Course. First half-year: Interpretation of Lagarde's *Analecta Syriaca*. Second half-year: Interpretation of the Syriac grammar (*Kethabha da Semhe*) of Bar Hebraeus. Professor GOTTHEIL

Tu. and Th. at 4.30

Courses in Ethiopic

17—Principles of the grammar and easy readings, in connection with Prætorius' *Æthiopische Grammatik*. Professor GOTTHEIL

Hours to be arranged

Semitic Seminar

The Seminar for 1898-9 will take up the study of current questions in Semitic linguistics and history, with especial reference to modern methods of philological research. Professor GOTTHEIL

Tuesday evening at 8.15

Attendance at the meetings of the Seminar will be obligatory upon candidates for the degrees of Master of Arts and Doctor of Philosophy whose major subject is in Semitic languages. The meetings are open also to advanced students one of whose minor subjects is in the Department of Semitic Languages

Courses in Semitic Languages at the Union Theological Seminary

Announcement of these courses will be given in the circular soon to be issued by the Department of Oriental Languages. Such courses may be counted as part of the work required for the degrees of Master of Arts and Doctor of Philosophy

Courses in Turkish

First half-year: Principles of the grammar, in connection with the study of A. Müller's *Türkische Grammatik* (*Porta Linguarum Orientalium*, pars xi). Second half-year: Exercises in Turkish conversation and in the reading of Turkish newspapers. Mr. YOHANNAN

Tu. and Th. at 3.30

INDO-IRANIAN LANGUAGES

The courses of instruction in this department are intended to be introductory to the study of comparative philology, and of the history of religion, as well as to the study of the history, antiquities, and literature of India and Persia, and

also of Armenia. The course arranged for beginners in Sanskrit, Indo-Iranian 1 may be taken with advantage in connection with any of the Latin, Greek, or other linguistic courses

Courses 1, 2, 3, are open to Seniors in Columbia College and to university students. In the case of Course 1, candidates for the higher degrees will be required to supplement the study by additional work to be assigned, or by taking some kindred course in the department. Courses 4, 5, 6, 7, 10, 11, and 12 are open to advanced students only. Courses 8 and 9 are open to students pursuing one other course in the department

Course 11 is open to auditors, and to women on the same terms as to men

Courses 1, 2, 3, 4, and 11 are intended to be given each year. Courses 5, 6, 7, 8, and 12 form a supplementary series. Two of these will be given each year according to the requirements of the students in attendance

Course 9, on some special Iranian subject, and Course 10, on Zoroaster and Buddha and their teaching, will be offered every second and third year respectively

Courses

1—Sanskrit, Elementary Course. Whitney's *Grammar*, Perry's *Primer*, Lanman's *Reader*. Professor JACKSON

M., W., and F. at 11.30

2—Avestan, Elementary Course. Grammar and reading of texts. Jackson's *Avesta Series : Part I, Grammar ; Part II, Texts*. Professor JACKSON

W. and F. at 2.30

3—Sanskrit, Advanced Course. First half-year: Kālidāsa's *Ritusamhāra* with the native commentary, or a Sanskrit drama. Second half-year: Introduction to the study of the Veda. Professor JACKSON

M. and W. at 12.30

[4—Avestan, Advanced Course. Interpretation of texts, antiquities, and literature. Geldner's *Texts of the Avesta*. Professor JACKSON

Two hours weekly. Hours to be arranged

Not given in 1889-1900. To be given in 1900-1901]

[5—Pāli, Elementary Course. E. Müller's *Simplified Pāli Grammar*, Ellwell's *Nine Jātakas*. Professor JACKSON

One hour weekly. Hour to be arranged

Not given in 1899-1900. To be given in 1900-1901]

6—Old Persian Cuneiform Inscriptions. Spiegel's *Die altpersischen Keilinschriften*, Bartholomae's *Handbuch der altiranischen Dialekte*, Weissbach and Bang's *Die altpersischen Keilinschriften*. Professor JACKSON

One hour weekly, first half-year. Hour to be arranged

This course is to run parallel with the Advanced Avestan

7—Pahlavi, Introductory Course. C. de Harlez's *Manuel du Pehlvi*. Professor JACKSON

One hour weekly, second half-year. Hour to be arranged

This course is to run parallel with the Advanced Avestan

8—Sanskrit Literature. Lectures on some branch of the literature; rapid reading of assigned texts. Professor JACKSON

One hour weekly. Hour to be arranged

9—Zoroastrian Gāthās. Reading of texts with the Pahlavi and the Sanskrit version. Professor JACKSON

One hour weekly. Hour to be arranged

11—Modern Persian, Introductory Course. First half-year: Grammar and reading. Salemann and Shukovski's *Persische Grammatik*. Second half-year: Interpretation of Sa'di's *Gulistan*. Mr. YOHANNAN

Tu. and Th. at 1.30

12—Modern Persian, Second-year Course. Firdausi's *Shāh Nāmah*. Mr. YOHANNAN

W. and F. at 1.30

Course in Armenian

1—Principles of the Grammar, with selected readings. Mr. YOHANNAN

W. and F. at 2.30

Seminar

Indo-Iranian Seminar. Professor JACKSON

Hour and subjects for 1899-1900 to be arranged

Lectures

A course of afternoon lectures on the literature, antiquities, and religion of Ancient India and Persia, open to all students of the university and to auditors, was given during the winters of 1895-6, 1896-7, 1897-8, and 1898-9. It is intended that this course of general lectures shall be offered each alternate year hereafter

CLASSICAL PHILOLOGY

For course in Methods of Instruction in the Classics, see below, p. 59

GREEK (INCLUDING ARCHÆOLOGY AND EPIGRAPHY)

Courses 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, and 30 are open to Seniors in Columbia College and to university students; Courses 21, 22, 24, and the Seminar are open to advanced students only

Courses 6 and 7 and 30 may not be counted toward the degree of Master of Arts or Doctor of Philosophy; Courses 9, 10, 11, 12, 13, 14, 15, and 20 may be so counted if special work is done in connection therewith

Courses 9, 10, 11, 12, 13, 17, 18, 19, 20, 21, 22, 24, 30, and the Seminar are open to women on the same terms as to men

Courses 9, 10, 11, 17, 18, 19, 20, and 24 are open to auditors

Courses

6—First half-year: Æschylus' *Prometheus* and Sophocles' *Antigone*. Second half-year: Thucydides. For private reading in the course of the year, with occasional conferences with the instructor: Sophocles' *Œdipus Tyrannus*. Professor PERRY and Dr. YOUNG

M., W., and F. at 11.30

7—Advanced Greek Prose Composition. Professor WHEELER

One session weekly, with written exercises, counting as a two-hours course

[9—Lectures on Greek Literature, with readings. Part I : Poetry. Professor WHEELER

Not given in 1899-1900]

Courses 9, 10, and 11 are given in successive years

[10—Lectures on Greek Literature, with readings. Part II : Prose. Professor WHEELER

Not given in 1899-1900]

11—Plato's *Republic* and Aristotle's *Ethics*. Professors PERRY and WHEELER M., W., and F. at 10.30

[12—The Lyric and Bucolic Poets. Professor PERRY

Two (or three) hours a week

Not given in 1899-1900]

13—Aristotle's *Poetics*, with illustrative reading of three or more plays. Professor WHEELER

M. and W. at 2.30

Courses 12 and 13 will probably be given in alternate years

14—New Testament Greek. First half-year : Gospel of St. Matthew and Acts of the Apostles. Second half-year : Selected Epistles. Dr. YOUNG

M. and W. at 3.30

[15—Selections from the Greek Christian Fathers. Dr. YOUNG

Not given in 1899-1900]

Courses 14 and 15 are given in alternate years

[17—Introduction to the Study of Greek Archæology. Part I : Vases, Paintings, Coins, Gems. Professor WHEELER

Not given in 1899-1900]

18—Introduction to the Study of Greek Archæology. Part II : Sculpture. Dr. YOUNG

Tu. and Th. at 3.30

Courses 17 and 18 are given in alternate years

[19—Lectures on the Manners and Customs of the Ancient Greeks. Dr. YOUNG

Not given in 1899-1900]

Course 19 and Latin 10 are given in alternate years

[20—Readings from Pausanias, with illustrated lectures on the Monuments of Olympia and Attica. Dr. YOUNG and Professor WHEELER

Not given in 1899-1900]

21—Greek Epigraphy. Lectures, and practice in the reading of inscriptions. Professor WHEELER

One session weekly, counting as a two-hours course. Hours to be arranged

[22—Greek Dialectic Inscriptions. Professor PERRY

Not given in 1899-1900]

Courses 21 and 22 are given in alternate years

[24—Methods of Classical Philology. Lectures. Professor PERRY
Not given in 1899-1900]

25—See: Courses in Methods of Instruction in the Classics, p. 59

30—Modern Greek. Dr. ROGERS. Two hours, second half-year only.
Hours to be arranged

Designed for persons who intend to visit Greece. May not be counted for a degree

Classical Seminar, Greek Section

First half-year: Interpretation of extracts from Ritter and Preller's *Historia philosophiæ e fontium locis contexta* (6th ed. by Schulthess, Gotha, 1888), with preparation and discussion of original papers. Second half-year: Interpretation of selected dialectic inscriptions, with discussion of original papers. Professor PERRY

One and a half hours weekly, counting as a three-hours course

F., 3.30-5

Courses in New Testament Greek at the Union Theological Seminary

Full announcement of these courses will be given in the forthcoming special circular concerning the courses in Classical Philology. These courses at the Seminary may be offered as part of the work required for the degrees of Master of Arts and Doctor of Philosophy (see p. 41)

LATIN (INCLUDING ARCHÆOLOGY AND EPIGRAPHY)

Courses 4, 5, 6, 7, 10, 14, 20, and 25 are open to Seniors in Columbia College and to university students

Courses 8, 18, and 19 are open to advanced students only, except by special permission of the head of the department

Courses 6, 10, and 20 may not be counted toward the degree of Master of Arts or Doctor of Philosophy

Courses 5, 6, 7, 8, 14, 21, and 25 are open to women on the same terms as to men

Courses 6, 10, 21, and 25 are open to auditors

Courses

4—Plautus and Terence. Dr. MCCREA

Tu. and Th. at 9.30

5—Introduction to the study of Roman Epigraphy. Professor EGBERT

M. and W. at 3.30

6—Rapid Reading of Horace. Professor PECK

Tu. and Th. at 2.30

[7—The Annals of Tacitus. Roman historical readings. Professor EGBERT
Two hours

Not given in 1899-1900]

- 8—Latin Manuscripts. Course in Latin Palæography. Professor EGBERT
Two hours weekly. Hours to be arranged
- [9—Lectures on the History of Greek and Roman Prose Fiction, with supplementary reading. Professor PECK. Two hours, first half-year only
Not given in 1899-1900]
- 10—The Private Life of the Romans. Illustrated lectures. Dr. McCREA
Tu. and Th. at 10.30
- [11—Latin Bibliography. Lectures. Professor PECK. Two hours, second half-year only
Obligatory for students making Latin their major subject
Not given in 1899-1900]
- 12—Advanced course in Latin Inscriptions. Professor EGBERT
Two hours weekly. Hours to be arranged
- 14—Roman Historical Readings. Annals and Histories of Tacitus. Professor EGBERT
Tu. and Th. at 2.30
- 15—Ecclesiastical Latin. Professor EGBERT
Tu. and Th. at 11.30
- 18—The Satires of Persius. Preparation of special papers. Professor PECK
Tu. and Th. at 11.30. First half-year only
- 19—The Medea of Seneca. History of Roman Tragedy. Professor PECK
Tu. and Th. at 11.30. Second half-year only
- 20—Catullus and the Elegiac Poets. Mr. BURCHELL
Tu. and Th. at 11.30
- 21—Introduction to the Study of Roman Numismatics. Mr. OLCOTT
One hour weekly. Hour to be arranged
- 25—See: Courses in Methods of Instruction in the Classics below

Classical Seminar, Latin Section

Early Latin, from the Inscriptions. Professors PECK and EGBERT
Two hours twice a month, second half-year

Courses in Methods of Instruction in the Classics

A course in Methods of Teaching Latin and Greek in Secondary Schools will be conducted throughout the year. During the first half-year the course will be given, as one, at Columbia University, by Professors PECK, PERRY, WHEELER, and EGBERT, Drs. YOUNG and McCREA, and Mr. BURCHELL. During the second half-year the course will be divided into two: Methods of Teaching Latin (Education 21), and Methods of Teaching Greek (Education 18) in Secondary Schools, which will be given at Teachers College, consisting of observations and reports, practice-teaching, etc.

M. and W. at 4.30

GERMANIC LANGUAGES AND LITERATURES

Courses 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20 are open to Seniors in Columbia College and to university students; the Seminar is open to advanced students only

All the courses in this department, except the optional courses in German, and courses 6, 7, 8, and 9, are open to women on the same terms as to men

Courses 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, and 20 are open to auditors

Courses in German

6—History of German Literature, from the earliest times to the Nineteenth Century. Lectures, themes, and readings from Müller, *German Classics*. Professor THOMAS

Tu. and Th. at 9.30

7—Goethe's *Faust*: First and Second Parts. Lectures and recitations. Professor THOMAS

Tu. and Th. at 10.30

8—Practice in Speaking and Writing German. Talks, conferences, and themes (all in German) upon linguistic and literary topics. Dr. TOMBO

Tu. and Th. at 12.30

9—History of the German Language from the Old High German period to the present day. Lectures and texts. Professor W. H. CARPENTER

Tu. and Th. at 1.30

10—Great German Writers. Lessing (first half-year) and Goethe (second half-year). Lectures and essays. Professor THOMAS

W. and F. at 11.30

[11—Old High German. Lectures and texts. Professor W. H. CARPENTER
Two hours

Not given in 1899-1900. To be given in 1900-1901]

19—Teachers' course. Lectures upon methods of teaching and cognate topics (first half-year). Professor THOMAS and Mr. BABBITT. Essays, discussions, reports of observation, and practice-teaching; identical with Education 17 in Teachers College (second half-year). Mr. BAGSTER-COLLINS and Mr. BABBITT

W. and F. at 4.30

Second half-year at Teachers College; hours to be arranged

20—Geschichte der deutschen Litteratur im 19. Jahrhundert. Vorlesungen in deutscher Sprache. Professor THOMAS

Tu. and Th. at 4.30

Optional Courses in German

None of these courses may be counted for a degree

Elementary Course. Thomas, *Practical German Grammar*; Harris, *German Composition*; easy stories and plays; in the second half-year more difficult prose, by such authors as Heine, Riehl, and Freytag. Mr. HERVEY and Dr. TOMBO

This course is identical with German A in Columbia College

Section 1 : M., W., and F. at 10.30

" 2 : " " " 1.30

" 3 : " " " 2.30

Intended for students who have not studied German before entering the University

1—Longer Elementary Course. Mr. BABBITT and Dr. TOMBO

M., Tu., W., Th., F., and S. at 10.30

Intended for students who have not studied German before entering the University

2—Grammar, Reading, and Composition. Mr. BABBITT and Dr. TOMBO

M., W., and F. at 2.30

A second section at hours to be arranged

Open to students who already have an elementary knowledge of German. The text-books and plan of work are in general the same as those of the second half-year of Course 1

Students who have taken Course 1 or 2 will be prepared to join one of the following courses at the beginning of the second year, either of which will be accepted as an equivalent of the reading knowledge of German required of candidates for the degree of Doctor of Philosophy in the School of Philosophy

3—Selected works of Goethe, Schiller, and Lessing. Texts, chiefly dramatic, and essays. Mr. HERVEY

M., W., and F. at 12.30

4—Historical Prose. One volume of Freytag's *Bilder aus der deutschen Vergangenheit*, and other works of a historical character. Mr. BABBITT

M., W., and F. at 3.30

5—Scientific German. Brandt and Day, *German Scientific Reading*, and various scientific monographs. Mr. HERVEY

M., W., and F. at 3.30

Courses in Scandinavian

[12—Swedish. Elementary course in the language, with miscellaneous reading and a general survey in lectures of the history of Swedish literature. Professor THOMAS

Two hours

Not given in 1899-1900. To be given in 1900-1901]

[13—Danish. Elementary course in the language, with miscellaneous reading and a general survey in lectures of the history of Danish literature. Professor THOMAS

Two hours

Not given in 1899-1900. To be given in 1901-1902]

14—Icelandic, Elementary Course. Kahle, *Altisländisches Elementarbuch*. Professor W. H. CARPENTER

W. and F. at 12.30

Courses 14 and 15 are given in alternate years

[15—Icelandic, Advanced Course. The Elder Edda. Lectures and texts.
Professor W. H. CARPENTER

Two hours

Not given in 1899-1900]

Course in Dutch

16—Dutch. Elementary course in the language, with miscellaneous reading and a general survey in lectures of the history of Dutch literature. Professor W. H. CARPENTER

W. and F. at 9.30

Course in Gothic

17—Gothic. Lectures and texts. Professor W. H. CARPENTER

Tu. and Th. at 2.30

Germanic Philology

18—General Introduction to Germanic Philology. Lectures and exercises. Professor W. H. CARPENTER

M. and W. at 2.30

Germanic Seminar

Germanic Seminar—Middle High German. Critical study of Wolfram von Eschenbach's *Parzival* (first half-year). Literature of the Revolution of 1848 (second half-year). Professors W. H. CARPENTER and THOMAS

Two hours weekly; hours to be arranged

Open to advanced students only. Attendance at the meetings is obligatory upon candidates for the degree of Doctor of Philosophy whose major subject lies in this department

ROMANCE LANGUAGES AND LITERATURES

The following courses are open to Seniors in Columbia College and to university students: French 5, 6, 7, 8, 9, 10, 11, 13, 14, and 15; Italian 2, 3, and 4; Spanish 2, 3, and 5; Romance Philology 1

The following courses are open to advanced students only: French 16, 17, and the Seminar; Provençal 1; Italian 5; Spanish 4; Portuguese 1; Rumanian 1; Romance Philology 2, 3, 4, and the Seminar

The following courses are open to women: French C, 11, 13, 14, 15, 16, 17, and the Seminar, Provençal 1; Italian 4 and 5; Spanish 4 and 5; Portuguese 1; Rumanian 1; Romance Philology 1, 2, 3, 4, and the Seminar

The following courses may not be counted toward the degree of Master of Arts or Doctor of Philosophy: French C, 1, 2, 3, 4, and 12; Italian 1; Spanish 1

The following courses are open to auditors: French 11, 13, 14, 15, 16, 17, and the Seminar; Provençal 1; Italian 4 and 5; Spanish 4 and 5; Portuguese 1; Rumanian 1; Romance Philology 1, 2, 3, 4, and the Seminar

Courses in French

C.—Elementary course for advanced students. Three hours per week during the first term; two hours during the second term. Mr. NITZE

Intended for advanced students who have had no opportunity to study French before

- 1—Grammar, Reading, Composition. Mr. JORDAN and Mr. NITZE
M., W., and F. at 10.30. 503 Fayerweather
- 2—General introduction to the study of French Literature. Composition.
Mr. LOISEAUX and Mr. JORDAN
M., W., and F. at 9.30 and at 10.30. 503 and 501 Fayerweather
- 3—French Rhetoric. Study of French prose and verse composition. Mr.
LOISEAUX
M., W., and F. at 2.30. 503 Fayerweather
- 4—History of French Literature in the Seventeenth Century. Professor
COHN and Mr. BARGY
M., W., and F. at 10.30. 613 Fayerweather
- 5—History of French Literature in the Eighteenth Century, especially Vol-
taire. Professor COHN
M., W., and F. at 11.30. 503 Fayerweather
Counts only as a two-hours course for students who have taken Course 6
- [6—History of French Literature in the Eighteenth Century, especially
Montesquieu, Rousseau, and the Encyclopedists. DR. WOODWARD. Three
hours
Counts as only a two-hours course for students who have taken Course 5
Not given in 1899-1900
Courses 5 and 6 are given in alternate years
- [7—History of French poetry in the First Half of the Nineteenth Century,
especially Victor Hugo and the Romantic movement. Dr. PAGE. Two hours
Not given in 1899-1900
- 8—History of French poetry in the Second Half of the Nineteenth Century.
Mr. BARGY
Tu. and Th. at 1.30
Courses 7 and 8 are given in alternate years
- [9—The French Dramatists of the Nineteenth Century. Professor BRANDER
MATTHEWS. Two hours, first half-year only
Identical with the first half of Course 4 in the Department of Literature
Not given in 1899-1900
- 10—Molière and his Dramatic Method. Professor BRANDER MATTHEWS
Tu. and Th. at 3.30 and Sat. at 11.30, first half-year only
Identical with Course 5 of the Department of Literature
- 11—History of Literary Criticism in France, especially Sainte-Beuve and
Brunetière. Mr. BARGY
M. and W. at 3.30. 421 Library
- 12—History of the French Language. Professor Todd
M., W., and F. at 12.30, first half-year only. 306 Library
- 13—Old French. Reading of selected extracts. Mr. NITZE
Tu. and Th. at 2.30, first half-year only
- 14—The French Chroniqueurs of the Middle Ages. Mr. NITZE
Tu. and Th. at 2.30, second half-year only

15—French Literature of the Sixteenth Century. Mr. LOISEAUX
Tu. and Th. at 4.30

[16—Critical Bibliography of French Literature from the Sixteenth to the
Twentieth Century. Professor COHN. Two hours
Not given in 1899-1900]

17—Methods of Teaching French. Professor COHN
M. and W. at 3.30. 402 L.

Intended for graduates, and also for students in Teachers College

Seminar

Special topics in Romance Literature. Subject for 1899-1900: The French
drama from the death of Voltaire to the Revolution of 1848. Professor COHN
M. and W., 4.30

Optional Courses in French Conversation

Elementary Course. Mr. JORDAN. One hour

Advanced Course. Mr. BARGY. One hour

Open to all members of the University

Provençal

1—Old Provençal. Professor TODD

Th. at 4.30

Italian

1—Elementary Course. Grammar, Reading, Composition. Professor
SPERANZA

M., W., and F. at 3.30

[2—Italian Literature in the Sixteenth Century. Professor SPERANZA. Three
hours

Not given in 1899-1900]

3—Italian Literature in the Fourteenth and Fifteenth Centuries, exclusive of
the *Divina Commedia*. Composition. Professor SPERANZA

M., W., and F. at 2.30

Courses 2 and 3 are given in alternate years

4—Critical study of Dante's *Divina Commedia*. Professor SPERANZA

Tu. and Th. at 2.30

5—History of Italian Literature. Lectures and private reading. Professor
SPERANZA

Tu. at 1.30

Spanish

1—Elementary Course. Grammar, Reading, Composition. Mr. LOISEAUX
M., W., and F. at 9.30

2—Don Quijote and the time of Cervantes. Composition. Professor TODD
and Mr. FITZ-GERALD

Hours to be arranged

[3—The Classical Dramatists of Spain. Lope de Vega, Calderon, etc.
Composition. Professor TODD and Mr. FITZ-GERALD. Three hours

Not given in 1899-1900]

Courses 2 and 3 are given in alternate years

4—The Origins of Spanish Poetry ; *El Poema del Cid*. Professor TODD
Th. at 12.30

5—History of Spanish Literature. Lectures and private reading. Professor
COHN. One hour

W. at 10.30

Open to all students who are able to read Spanish with facility

Portuguese

1—Elementary Course. Grammar, Reading, Composition. Professor TODD.
Two hours

Intended for graduates who have a knowledge of French and one other Romance language, and also a reading knowledge of German

Rumanian

1—Elementary Course. Grammar, Reading, Composition. Professor COHN.
Two hours

Intended for graduates who have a knowledge of French and one other Romance language, and also a reading knowledge of German

Romance Philology

1—Introduction to Romance Philology. Professor TODD
M. and W. at 3.30. 306 F. Library

[2—The works of Chrétien de Troyes. Professor TODD
One hour

Not given in 1899-1900]

[3—Old French Dialects. Professor TODD
One hour

Not given in 1899-1900]

4—The Formative Elements of Romance Speech. Professor TODD
Tu. at 3.30. 306 F. Library

Seminar

Special Topics in Romance Philology. Subject for 1899-1900 : The Sources
of the *Chanson de Roland*

F., 3.30-5.30. 306 F. Library

Public Lectures

Once a week a lecture will be given in French by one of the instructors in
the Department, or by some invited lecturer. The name of the lecturer and
the subject will be announced one week in advance

Every year the Department offers a course of four lectures in English on
some subject of Romance Literature. In 1897-8 Professor Cohn lectured upon
Voltaire. In 1898-9 Dr. Page lectured upon Victor Hugo. In 1899-1900
Professor Todd will lecture on the *Chanson de Roland*

These lectures are open to the public

Romance Club

Reports of the most important articles in leading periodicals are given at
stated times in the social meetings of the Romance Club, usually twice a month

Société Française de l'Université Columbia

The *Société Française de l'Université Columbia* is an association of students having for its object the development among its members of facility in the use of the French language in conversation. There is a similar association at Barnard College

MUSIC

Courses 1, 2, 3, and 6 are open as electives to Seniors in Columbia College, and to university students; Courses 4, 5, and 7 to university students. Courses 8 and 9 are optional, and are open without fee to university students. All the courses are open to persons who can demonstrate to the Professor of Music, by examination or otherwise, that they are competent to profit by them. Members of Courses 1, 2, 3, and 7 are required to take, also, Course 6. Members of Course 5, unless they have already done so, are required to take either Course 1 or Course 2. All male students in the Department, unless excused, are required to take either Course 8 or Course 9. All the courses are open to auditors; and all, except Course 8, to women on the same terms as to men

1—General Musical Culture. The origin of music and its relation to speech and the emotions. Its history from the earliest times up to the nineteenth century. Professor MACDOWELL

S. at 9.30

2—Modern Music; musical analysis and the relation of music to the other arts; musical criticism. Professor MACDOWELL

W. at 1.30

Courses 1 and 2, while outlining the purely technical side of music, aim at giving a general idea of music from its historical and æsthetic side

3—Lectures and Class-work. General theory, harmony, and the commencement of composition in the smaller forms. Mr. MCWHOOD

W. at 2.30, and S. at 9.30

4—Lectures and Class-work. First half-year; strict counterpoint, canon, fugue; second half-year: free counterpoint, canon, and fugue; commencement of composition in the larger forms. Professor MACDOWELL

W. at 4.30, and S. at 11.30

5—Lectures and Class-work, with practical illustrations. This course treats of free composition, analysis, instrumentation, symphonic forms. Professor MACDOWELL

W. at 2.30, and S. at 10.30

6—Melodic, Rhythmic, and Harmonic Dictation, and the Practical Analysis of Chords. Mr. HINRICHS

S. at 10.30

7—Musical Seminar. This course treats of the practical composition of music. Professor MACDOWELL

W. at 3.30

8—University Chorus. Mr. HINRICHS

Tu. and F. at 3.30

9—University Orchestra. Mr. HINRICHS

Tu. and F. at 4.30

TEACHERS COLLEGE DIPLOMA

The course of study in Teachers College for intending teachers in secondary schools is so arranged that candidates for higher degrees in Columbia University may, if they so desire, obtain the Diploma of Teachers College at the time of receiving the university degree. The Diploma is granted to students of approved scholastic attainments in any subject, who having previously taken a course equivalent to Psychology A, take Education 1, 2, and 3, and such selection from Education 11, 12, 13, 15, 16, 17, 18, 19, 21, 22, 23, and 25, as is required for the Diploma in the several subjects to which those courses relate. Details as to these courses will be found in the Announcement of Teachers College, which will be sent on application.

FACULTY OF PURE SCIENCE

The Faculty of Pure Science has charge of the university courses of instruction and research in all branches of pure science, and especially the supervision of candidates for the degrees of Master of Arts and Doctor of Philosophy in pure science. Students under other University Faculties are also at liberty to pursue courses of study and investigation under this Faculty.

Candidates for the higher degrees taking major subjects in pure science will be regarded as under the special jurisdiction of this Faculty.

In this Faculty are represented all the departments of the University which give instruction in pure science, namely :

DEPARTMENTS	HEADS OF DEPARTMENTS.
<i>Anatomy</i> (Physicians and Surgeons)	Professor HUNTINGTON
<i>Astronomy</i> (605 F.) *	Professor REES
<i>Bacteriology</i> (Physicians and Surgeons)	Professor PRUDDEN
<i>Botany</i> (507 S.)	Professor UNDERWOOD
<i>Chemistry, Inorganic and Organic</i> (303 H.)	Professor CHANDLER
<i>Geology, including Lithology and Palæontology</i> (403 S.)	Professor KEMP
<i>Mathematics</i> (203 C.)	Professor VAN AMRINGE
<i>Mechanics</i> (406 F.)	Professor WOODWARD
<i>Mineralogy</i> (307 S.)	Professor MOSES
<i>Physics</i> (303 F.)	Professor ROOD
<i>Physiology</i> (Physicians and Surgeons)	Professor CURTIS
<i>Zoölogy</i> (601 S.)	Professor OSBORN

Students registered under this Faculty are subject :

- 1st. To the general regulations of the University Council. (See p. 9.)
- 2d. To the special regulations of this Faculty.

Special Regulations of the Faculty of Pure Science

The degree of Doctor of Philosophy is awarded on the basis of a thorough training in the methods of advanced work and investigation in some branch of science. The following statements are offered for the guidance of students. In the case of students of especial ability or exceptional previous training, the Faculty may modify its usual regulations.

The student is expected to gain a sound general knowledge of the two minor subjects of his choice. In the major subject a much more thorough and

* For significance of numbers and letters, see p. 117.

special knowledge is required, particular importance being attached to training in research. In order to avoid undue specialization, no two subjects can be chosen from the same department without the consent of the Faculty.

The approval of the subject of the essay required for the degree of Master of Arts, or the subject of the dissertation required for the degree of Doctor of Philosophy, as well as the essay or dissertation itself, rests with the instructor in charge of the candidate's major subject. It is desirable that these studies should be related, and, when practicable, that they should be treated respectively as preliminary and completed investigations. Great importance is attached to the character of the final dissertation. While it must depend for acceptance chiefly on the subject-matter, it should show good literary workmanship, especially by directness and clearness of statement. It should demonstrate the author's capacity to do original scientific work and to render an intelligible account thereof. It should evince a familiarity with the literature of the subject and with the latest methods of research applicable to it. The treatment should be as concise as the nature of the work permits. Every dissertation should be preceded by a clear introductory statement setting forth the nature and the scope of the research, and be followed by a résumé of the results and the conclusions obtained. It should also be accompanied by a table of contents and by a list of the authorities consulted in its preparation.

TABLE SHOWING PARTIAL LIST OF COMBINATIONS OF SUBJECTS

MAJOR SUBJECTS	MINOR SUBJECTS	
Anatomy	Physiology	Zoölogy
	Zoölogy	Botany
	Physiology	Palæontology
	Physics	Chemistry
Astronomy	Mathematics	Mechanics
	Mathematics	Physics
	Physics	Mechanics
	Mathematics	Chemistry
Bacteriology	Zoölogy	Botany
	Zoölogy	Physiology
	Botany	Chemistry
	Physics	Chemistry
Botany	Zoölogy	Geology
	Zoölogy	Bacteriology
	Zoölogy	Physiology
	Physics	Chemistry
Chemistry	Physics	Mineralogy
	Physics	Geology
	Mathematics	Mechanics
	Botany	Zoölogy
Geology	Physics	Chemistry
	Zoölogy	Botany
	Mineralogy	Mechanics
	Astronomy	Physics

MAJOR SUBJECTS	MINOR SUBJECTS	
Mathematics	Astronomy Astronomy Physics Physics	Mechanics Physics Mechanics Chemistry
Mechanics	Mathematics Mathematics Physics Physics	Physics Astronomy Astronomy Chemistry
Mineralogy	Chemistry Chemistry Mathematics Botany	Physics Geology Physics Zoölogy
Physics	Mathematics Physiology Chemistry Chemistry	Mechanics Zoölogy Mineralogy Mechanics
Physiology	Anatomy Zoölogy Botany Physics	Zoölogy Botany Bacteriology Chemistry
Zoölogy	Botany Geology Physiology Bacteriology	Physiology Palæontology Chemistry Chemistry

ANATOMY

None of the courses in this department is open to women.

Collegiate Courses

1—Vetebrate morphology. Anatomy of the body cavities. Visceral and topographical course. Thorax and abdomen. Lectures combined with demonstrations, 3 hours. Professor HUNTINGTON

Required, in the second year, of candidates for the degree of M.D.

2—Demonstrations to sections of the class. Cranial osteology and syndes-mology, myology, angeiology of the head and neck and peripheral nervous system of the neck. 1 hour. Dr. BLAKE

Required, in the first year, of candidates for the degree of M.D. Elective, in conjunction with 3, 4, and 5, for seniors in Columbia College.

3—Demonstrations to sections of the class. Osteology, syndes-mology, my-ology, peripheral nervous system, and angeiology of the extremities. 2 hours. Dr. BROCKWAY

Required, in the first year, of candidates for the degree of M.D. Elective for seniors in Columbia College, in conjunction with 2, 4, and 5.

These courses are so arranged as to maintain, with reference to the subjects treated, a direct connection with the laboratory course in dissection, No. 5.

4—Demonstrations to sections of the class.

(B) Preliminary visceral course. Anatomy of the viscera and body cavities. 1 hour.

This portion of the course is designed to afford that general instruction in the descriptive anatomy and the relations of the viscera which is indispensable for the understanding of the courses in the normal histology and physiology of the viscera. Dr. BREWER

Required, in the first year, of candidates for the degree of M.D. Elective for seniors in Columbia College, in conjunction with 2, 3, and 5.

5—Laboratory course. Dissection of the human body. 18 to 20 hours a week, at various hours, for from 3 to 5 periods of 4 weeks each. Professor HUNTINGTON, Dr. GALLAUDET, and the ASSISTANT DEMONSTRATORS OF ANATOMY

Required, in the first year, of candidates for the degree of M.D. Elective for seniors in Columbia College, in conjunction with 2, 3, and 4.

6—Laboratory course. Dissection of the human body. 10 to 12 hours a week for from 6 to 11 weeks. Professor HUNTINGTON, Dr. GALLAUDET, and the ASSISTANT DEMONSTRATORS OF ANATOMY

Required, in the second year, of candidates for the degree of M.D.

7—Demonstrations to sections of the class. Anatomy of the mouth, pharynx, and larynx. The auditory apparatus. The central nervous system. 3 hours. Dr. GALLAUDET

Required, in the second year, of candidates for the degree of M.D.

8—Demonstrations to sections of the class. Visceral anatomy. This course preserves an organic connection with Course 1, and presents for direct examination and demonstration the preparations serving to illustrate that course. 2 hours. Dr. MARTIN

Required, in the second year, of candidates for the degree of M.D.

9—Demonstrations to sections of the class. Anatomy of the cranial nerves. 1 hour for one half-year. Dr. MARTIN

Required, in the second year, of candidates for the degree of M.D.

10—Laboratory courses in animal morphology. No specified number of hours a week. Professor HUNTINGTON

Optional for qualified candidates for the degree of M.D. Open as major or minor courses to candidates for the degree of A.M. or of Ph.D.

University Courses

11—The laboratory of animal morphology is open for research, under the direction of the Professor, to advanced workers. Professor HUNTINGTON

12—Comparative morphology of the carpus. A comparative study of the carpus in vertebrates above fishes, with especial reference to the homologies of the components, their evolution and significance, and their mutual relations in amphibia, reptiles, birds, and mammals. Professor HUNTINGTON

13—Comparative morphology of the respiratory apparatus, in mammalia, sauropsida, and batrachia. Evolution of the composite mammalian lung from

the air-sac. Morphology of mammalian bronchial tree. Construction of terminal branches and end spaces. Skeletal and other modifications of the respiratory apparatus in birds. Professor HUNTINGTON

14—Comparative morphology of the central nervous system. Demonstration and laboratory course. Detailed work in brain of cod, frog, turtle, bird, and mammal. Professor HUNTINGTON

15—Comparative myology.

(a) Appendicular muscles.

(b) Ventro-appendicular muscles.

(c) Muscles of the foot.

Professor HUNTINGTON

16—Human and comparative morphology of the auditory apparatus. Professor HUNTINGTON

17—Comparative morphology of the upper respiratory passages, nares, larynx, epiglottis, syrinx. Professor HUNTINGTON

18—Comparative morphology of the uro-genital system. Professor HUNTINGTON

19—Cranial topography. Professor HUNTINGTON

This course is designed for advanced students possessing a knowledge of the gross morphology of the human brain.

Pre-requisite: Course 7, or its equivalent.

20—Comparative morphology of the heart and vascular system. Development and modification of the venous system in vertebrates. Professor HUNTINGTON

21—Comparative morphology of the alimentary tract and digestive glands. Anatomy of the peritoneum. Professor HUNTINGTON

22—Comparative morphology of the cæcum and ileo-colic junction in vertebrates. Detailed study of the modifications of the structures and their vascular and serous relations. Professor HUNTINGTON

23—Topography of the pelvic viscera, muscles, and fasciæ. Professor HUNTINGTON

24—Anatomical technology and museum methods. Professor HUNTINGTON

Open only to teachers and qualified post-graduate students.

25—Lecture course on comparative vertebrate morphology. Professor HUNTINGTON

A series of university lectures and demonstrations based on the material contained in the Morphological Museum is given annually.

These lectures are incorporated in Course 1, and deal with the comparative anatomy of the circulatory, respiratory, alimentary, and uro-genital systems of vertebrates, together with certain portions of the skeleton, as the pectoral and pelvic girdles. The lectures are open to students under the Faculty of Pure Science. Details of subjects and dates will be furnished on application to the department.

Courses 10 to 24 inclusive are open, as majors or minors, to candidates for

the degrees of A.M. and Ph.D. ; to qualified candidates for the degree of M.D., as optional courses ; and to post-graduate students.

In all courses offered in morphology the work is designed to be laboratory exercises of at least two continuous hours' duration, at any one exercise, supplemented in certain courses by demonstration and study of material contained in the Museum of Human and Comparative Anatomy and in the study collections of the department.

The time required for the above courses is offered as minors for the degree of A.M. or Ph.D., or, if taken as optionals, is half a day per week from October to April.

The courses are given on Thursday and Saturday afternoons at the Anatomical Laboratory, College of Physicians and Surgeons.

By special arrangement other hours are assigned to the work in the cases of advanced students and investigators.

The demands on laboratory space and teaching force rendered it necessary to limit the number of candidates admitted to these courses.

Anatomical Laboratories

The laboratory facilities of the department of Anatomy are very complete. The large general dissecting-room accommodates from 390 to 546 students at a time, working in groups of five or seven, respectively, at one table.

The plant for the production of artificial cold by the anhydrous ammonia process has enabled the department, through the means offered for the indefinite preservation of fresh subjects by the cold-storage system, greatly to increase the amount of material available for laboratory work ; and has also rendered it possible so to regulate the temperature of the general laboratory, that the work can be carried on without difficulty during the warmer months at the beginning and close of the academic year.

The laboratory for advanced morphological research occupies the third story of the new Anatomical Building. Every facility for advanced and research work in morphology is here extended. The established connections of the department furnish abundant human and comparative material, both mature and embryonal. The private library of the Professor of Anatomy is at the disposal of advanced workers.

Museum of Human and Comparative Anatomy

Much work has been done in the formation of a Museum of Human and Comparative Anatomy, the ultimate design of which is to present, in as complete a manner as possible, a view of the evolution of the forms of animal life, and of their natural relations, both in series of natural groups, and in the comparative and relative position of organs and systems. Even the approximate attainment of this aim will require much time and work, but sufficient progress has been made to enable the department to offer great facilities for study and research. The collection, both as regards groups and the individual preparations, is designed for the illustration of both elementary and advanced courses, and is largely used in the instruction of the medical undergraduates and in advanced study and research. The new Anatomical Building provides the opportunity for the further development of this invaluable portion of the depart-

mental equipment. The first and second stories of the new building are devoted to the Morphological Museum, and it is hoped that in the space thus provided the continued development of scientific anatomy, both for purposes of undergraduate instruction and of advanced research, will steadily proceed.

In addition to the museum collection proper the department is constantly adding to a large collection for advanced study and research.

A study-collection of human osteological preparations is so administered as to enable every student to take out the different osteological series and retain them for private study as long as required.

ASTRONOMY

Courses 2, 4, 5, 6, 7, 8, and 9 are open to women on the same terms as to men.

1—General astronomy—This course is historical and descriptive, and is supplemented by visits to the observatory, where students are taught to locate the principal constellations, and are afforded opportunities to view the sun, moon, planets, nebulae, and stars. Reference books: Young's *General Astronomy*, Grant's *History of Physical Astronomy*, Clerke's *History of Astronomy during XIX Century*, and Clerke's *System of Stars*. 2 hours. Professor REES, assisted by Dr. MITCHELL

Open to seniors in the College and to graduates. Offered as a minor for the degree of A.M.

2—Spherical and practical astronomy—This course consists mainly of the study and use of the sextant for time and latitude determinations, and of the transit instrument for time. Reference books: W. W. Campbell's *Hand-book of Practical Astronomy*, Doolittle's *Practical Astronomy*. 2 hours lectures and 2 hours observatory work. Professor REES, assisted by Dr. MITCHELL

Open to seniors in the College who have taken Mathematics 6. Offered as a minor for the degree of A.M.

3—Geodesy—This course deals with the subjects named in the scheme of the Summer School in Geodesy. During the vacation the students are required to attend the summer school for six weeks to learn the use of apparatus, as indicated by the following:

Use of the nautical almanac and American ephemeris.

Sextant observations for time and latitude.

Transit instrument for time.

Base-line measurements.

Angle measurements by theodolites read by micrometer-microscopes.

Determination of the azimuth of a line.

Barometric hypsometry.

Reference books: Campbell's *Practical Astronomy*, Clark's *Geodesy*, *United States Coast Survey Reports*, and Jordan's *Handbuch der Vermessungskunde*. 2 hours lectures first year and first half of the second year. Professors REES and JACOBY, assisted by Dr. MITCHELL

Required of students in the Civil Engineering and in the Sanitary Engineering courses during third and fourth years. The third-year work is offered as a minor for the degree of A.M. The fourth-year, including summer-school work, is offered as a major for the degree of A.M. Open to seniors who have taken Mathematics 6.

4—Advanced spherical and practical astronomy—This course deals with the subjects of time, latitude, and longitude; use of equatorial and of zenith telescopes. Reference books: Chauvenet's (2 vols.) *Spherical and Practical Astronomy*, and Doolittle's *Practical Astronomy*. 2 hours lectures and 4 hours observatory work for 2 years. Professor REES

First year offered as a major for the degree of A.M. or a minor for the degree of Ph.D.
Two years' work offered as a major for the degree of Ph.D.

5—Theoretical astronomy—This course deals mainly with the theory of comet orbits and their calculation. Reference books: Klinkerfues' *Theoretische Astronomie* and Oppolzer's *Bahnbestimmung*. 1 hour, supplemented by computations, for 2 years. Professor JACOBY

First year offered as a major for the degree of A.M. or a minor for the degree of Ph.D.
Two years' work offered as a major for the degree of Ph.D.

6—Theory and method of reduction of photographic star plates—This course deals with the determination of star places from the photographic plates, and includes the subjects of stellar parallax and proper motion. 1 hour, with practical work, for 2 years. Professor JACOBY

First year offered as a major for the degree of A.M. or a minor for the degree of Ph.D.
Two years' work offered as a major for the degree of Ph.D.

7—The method of least squares, with applications to astronomy and to geodesy. 1 hour for 1 year. Professors REES and JACOBY

Offered as a major for the degree of A.M. or a minor for the degree of Ph.D.

8—Lectures on celestial mechanics—Elementary course. Follows the historical or chronological method. 1 hour for 1 year. Dr. HILL

Open to seniors and to graduates as a minor for the degree of A.M.

9—Advanced course in celestial mechanics. 1 hour for 1 or 2 years. Dr. HILL

Open to graduates as a major or minor for the degree of Ph.D. Also as a major for degree of A.M.

Equipment

The apparatus of the department consists principally of the following:

The Rutherford equatorial of 13 inches aperture with a correcting lens for photography.

Three transit instruments.

Two fine clocks and several chronometers.

Three chronographs.

Three-inch zenith telescope by Wanschaff of Berlin.

Measuring machine for photographs by Rutherford and by Repsold.

Personal equation machine.

Base-measuring apparatus.

Theodolites by Wanschaff of Berlin and Saegmuller of Washington, D. C., with micrometer-microscopes reading to a second of arc.

The Library of the University is well supplied with the books relating to the work of the department.

Astronomical Observatory

On account of the sale of the Observatory building and site, the instruments have been dismantled. At the new site transits and chronographs have been mounted. The Wanschaff zenith telescope has been in continuous use at the present site since 1893.

The Astronomical Observatory contains a set of portable astronomical instruments: A forty-six-inch transit, by Troughton & Simms; a combined transit and zenith instrument for time and latitude determination; an equatorially mounted refractor of five inches aperture, to which is attached a spectroscope with the dispersive power of twelve flint-glass prisms of fifty-five degrees, by Alvan Clark; also a diffraction spectroscope with grating, by L. M. Rutherford, Esq. A set of comparison apparatus, with electrodes, Plucker's tubes, coils, etc., accompanies the spectroscope. The observatory has two Repsold measuring machines for photographic work. Especial facilities are afforded for graduate work on photographic star plates.

A Wanschaff zenith telescope has been set up in a separate building and is used in making observations for variation of latitude and the constant of aberration.

By the gift of Mr. Rutherford there have been added to the observatory equipment: (1) An equatorial refracting telescope of thirteen inches aperture, supplied with a correcting lens for photographic work; with this instrument belong two micrometers for position measurements. (2) A transit instrument of three inches aperture by Stackpole & Brother. (3) A Dent sidereal clock. (4) A micrometer for measuring photographic plates, and sundry other pieces of apparatus. The observatory has a fine mean-time clock by Howard & Co., also chronographs by Fauth & Co. and Warner & Swazey, a personal equation machine, etc. The observatory and instruments are lighted by electricity.

BACTERIOLOGY

None of the courses in this department is open to women.

1—Practical instruction in bacteriology is given in the west laboratory on the fifth floor of the north wing of the College of Physicians and Surgeons. This course opens with the study of the relationship of bacteria to other micro-organisms. It embraces the methods of staining, examining, and cultivating. The student is taught by practical exercises the methods of separating one species of bacteria from another, and the series of biological characters used in identification of the various forms. The general relationship of certain micro-organisms to disease is considered and illustrated. Finally some of the hygienic aspects of bacteriology are studied by experiments in the sterilization of infectious materials, disinfection of the hands, and by practice in biological air, water, milk, and soil analysis. 6 hours a week for one quarter of the academic year. Drs. CHEESMAN, HISS, and NEUMANN

Required, in the second year, of candidates for the degree of M.D.

2—Special laboratory course—There is an opportunity each year for a few graduates in medicine, or other qualified workers, to receive a special course in practical bacteriology. The laboratory is abundantly supplied with apparatus

for the culture and study of micro-organisms, and has under cultivation a large collection of identified species. In this course the applications of bacteriology to sanitation and to practical medicine are held in view.

Methods of preparation, staining, microscopic study, and measurement of bacteria. Preparation of culture media ; study and record of observation of selected typical species ; systematic analyses for determination of unknown species ; methods of isolation of species ; qualitative and quantitative biological examinations of water, soil, and air ; methods of determining pathogenic properties, disinfection, modes of testing value of germicides.

Text-books : Abbott's *Principles of Bacteriology*, Sternberg's *Bacteriology*.

This course requires attendance at the laboratory during the entire afternoon in January, February, and March. Dr. CHEESMAN

Minor for the degree of A.M. or Ph.D.

3—Laboratory course—As under Course 2, with additional study and determination of known species of bacteria ; special study of the chemical products formed in the growth of bacteria ; practical work in photomicrography, and the pursuit of some selected theme for original investigation. Professor PRUDDEN, and Drs. CHEESMAN and LEAMING

Text-book : Flügge's *Mikroorganismen*.

Attendance and hours as in Course 2, with additional time for research.

Major for the degree of A.M. or Ph.D.

Photography, Photomicrography, and Skiagraphy

Practical instruction is given to a limited number of men in the photographic laboratories of the College, in the technique of photography, photomicrography, and skiagraphy for scientific purposes.

The time necessary for the acquirement of this technique varies with the facility of the student and the hours devoted to the theme, and is subject to special arrangement.

The facilities of these laboratories may be drawn upon for purposes of record and illustration by instructors in various departments of the College and by others. Dr. LEAMING

Research

Research in pathology and bacteriology may be pursued in the laboratories of this department by a limited number of graduate students or practitioners of medicine or other advanced workers, under the direction of the professor. To such men the large collection of pathological specimens preserved for microscopical study and the collection of bacterial cultures belonging to this department are accessible. Dr. PRUDDEN

Equipment

The department of Pathology occupied in the autumn of 1895 the large additional space which the new college buildings furnish. The large class-room on the upper floor of the north wing is used, as formerly, for the class in normal histology and in pathology. The fourth floor is devoted to the pathological

museum and to a large preparation laboratory, a workshop, cold-storage, and the like. The new space is devoted to a general laboratory and to private rooms for instructors and advanced workers in pathology, to undergraduate and to research work in bacteriology and clinical microscopy, and to a departmental library.

The entire space, new and old, is amply lighted, fully furnished, and equipped with such new apparatus as the rapidly growing sciences of pathology, bacteriology, and closely allied themes require.

The Bacteriological Laboratory

A special section of the northern wing of the College of Physicians and Surgeons in the department of Pathology is devoted to the work of bacteriology. The laboratory for the morphological and biological study of micro-organisms is suitably equipped, and the systematic study is greatly facilitated by the maintenance of the large collection of the known forms of bacteria, under cultivation. A separate laboratory is assigned to the chemical study of the metabolic products of germ life. The facilities for work in photo-micrography, which are maintained in connection with the department of Pathology, are accessible to workers in bacteriology.

BOTANY

The courses in Botany are arranged with the intention of giving a broad general knowledge of the subject during the first year, and permitting some degree of choice during the second year; for those who continue the work as a graduate subject, the widest possible range of subjects is open to the student's choice. Course 1 can be elected by any student who has reached the sophomore year, and if the subject be pursued consecutively for three years, the candidate will be ready to enter upon research work as a major subject. Two years would be sufficient for this preparation if the candidate elected two courses in Botany during the second year. Courses 1-4, or their equivalent, together with Course 5 or Course 7, according as the trend is toward morphology or physiology, form the necessary preparation for commencing a major subject in Botany. Course 1, with any two additional courses or an equivalent, will be required as the necessary preparation for commencing a minor subject in Botany. Minor graduate courses will be arranged after conference with the head of the department.

Auditors will be admitted to any courses for which they may be prepared.

The lectures of Courses 9-15 are open to women.

Courses 9-15 are primarily for graduate students, and the times for conference and laboratory hours will be arranged with each candidate individually.

1—Elementary botany—The general biological features of plants and the outlines of the evolution of plant types are considered; special attention being given to the significance of morphological characters and the forces operative in their development. 2 laboratory sessions a week, including conferences. Professor UNDERWOOD and Dr. CURTIS

Open to those who have reached the sophomore year.

2—Comparative anatomy of vascular plants—An examination of the comparative morphology of the cell is followed by the study of the distribution of tissues, with special regard to their functions. 2 laboratory sessions a week, first half-year. Dr. CURTIS

Pre-requisite : Course 1, or its equivalent.

3—Plant physiology—A course in experimental physiology supplemented by selected readings and conferences. 2 laboratory sessions a week, first half-year. Dr. CURTIS

Pre-requisite : Course 1, or its equivalent.

NOTE—In this and other courses in vegetable physiology the nature of the work occasionally requires attendance at the laboratory at unusual times.

4—General morphology of cryptogams—Detailed study of some group or groups of the lower plants. 2 laboratory sessions a week, second half-year. Dr. HOWE

This course naturally follows Course 2, to complete an elective for the year. Pre-requisite : Course 1, or its equivalent.

5—Botanical problems—Illustrating advanced methods of fixing, imbedding, sectioning, and staining. 2 laboratory sessions a week, second half-year. Dr. CURTIS

Pre-requisite : Course 2.

6—Economic botany—Study of plants useful to man as food, medicine, timber, and fibre. 2 hours lecture, or the equivalent in the laboratory. Professor UNDERWOOD

Pre-requisite : Course 1, or its equivalent.

7—Plant physiology—A continuation of Course 3, but with the added pre-requisite of Course 2. 1 lecture and 2 laboratory sessions, second half-year. Dr. CURTIS

8—General botany—A brief systematic study of plant structure and function, and the characters and relations of the leading groups of plants. 2 lectures and laboratory work, first half-year. Professor UNDERWOOD and Dr. HOWE

Required of first-year students in the Schools of Mines, and in the course in Civil Engineering.

9—The natural families of flowering plants—Study of the diagnostic characters of the leading families in biological sequence. Reference books : Engler and Prantl's *Natürlichen Pflanzen familien* and Baillon's *Histoire des Plantes*. 1 hour conference and 2 laboratory sessions. Professor UNDERWOOD

Pre-requisite : Course 2. Offered as a major for the degree of A.M. if preceded by Courses 1-5.

10—Special morphology of fungi—A study of the special morphology, polymorphism, and development of the fungi, including culture methods. Not less than 10 hours a week, including special field-work. Professor UNDERWOOD

Pre-requisite : Course 4. Offered as a major for the degree of A.M. if preceded by Courses 1-5.

11—Research in morphology—The investigation of special problems in morphology with particular relation to their bearings on phylogeny, and

involving field and experimental work. Not less than 10 hours a week for three years (or with special work two summers in the field, two years). Professor UNDERWOOD and Dr. HOWE

12—Research in plant physiology—Special problems connected with growth and nutrition will be assigned after conference. The department will provide ample facilities, however, in any special research that may be desired. Not less than 10 hours a week for three years (or with special work during two summers, two years). Dr. CURTIS

13—Comparative embryology—Beginning with the Angiosperms, the embryology of special forms is considered, tracing their ontogeny from the gametophyte to the differentiations of the primary systems of the sporophyte; this is followed by a similar study of types from lower classes in biological sequence. Not less than 10 hours a week for three years (or with special work during two summers, two years). Dr. CURTIS

14—Critical study of a family or genus of plants of not less than fifty species—The group may be selected from the entire range of the vegetable world, but will be selected with a view to the special opportunities for field observation or garden cultivation. Field, herbarium, and laboratory work. Not less than 10 hours a week for two years, with two summers in the field. Research. Professor UNDERWOOD

15—Collection, determination, and comparative study of the plants of some restricted area—Field, herbarium, and laboratory work. Not less than 10 hours for two years; field-work during two summers. Research. Professor UNDERWOOD

Courses 11-15 are offered as major courses for the degree of Ph.D. A proportionate amount of work in Courses 11-14 will be accepted as a major for the degree of A.M.

Equipment

The department of Botany occupies the third floor of Schermerhorn and the laboratories and lecture-rooms have been newly equipped for undergraduate work. A large general laboratory, lecture-room, and morphological and physiological laboratories are supplied with modern instruments for instruction and experiment. The courses of instruction are illustrated with extensive series of models, charts, and lantern-slides. Fresh material is supplied from the conservatory and aquaria. A sufficient number of standard botanical works and serials are reserved for students' use in the general laboratory, where they will be more directly available in connection with the laboratory practice.

By the agreement entered into between the University and the New York Botanical Garden, all the botanical collections and library of the University (except such as are needed for undergraduate work) are to be deposited in the Museum of the Botanical Garden at Bronx Park; the Garden on its part is to supply all the needed facilities for research work in morphology, physiology, and taxonomy. This combination of forces not only places the department of Botany within reach of material equipment and collections not before available, but opens up facilities for advanced work under conditions that are not excelled.

Commencing with the session of 1899-1900 the graduate work will be carried on at the Botanical Museum, where extensive laboratories are fitted up for research.

The Herbarium, at present accommodated in the large general laboratory (502), will be established during the present summer in the large herbarium room in the east wing of the Botanical Museum, where the extensive collections of the New York Botanical Garden can be consulted in connection with it.

The University collection itself contains about 500,000 specimens, being one of the largest in America; additions are at present made to it at the rate of about 20,000 specimens a year. It comprises: (1) The collections accumulated by Dr. Torrey, which came into the possession of the University at his death in 1873. (2) The collections of Prof. C. F. Meisner of Basle, Switzerland, presented to the University about the time of Dr. Torrey's death by Mr. John J. Crooke. (3) The collections of Dr. A. W. Chapman of Appalachicola, Florida, presented by Mr. Crooke at the same time; this contains the types illustrating Dr. Chapman's *Flora of the Southern United States*. (4) The moss collection of the late C. F. Austin. (5) The moss collection of the late Dr. J. G. Jaeger, acquired in 1893. (6) Miscellaneous accumulations of spermatophytes, since Dr. Torrey's death, now making up more than one third of the whole collection. (7) A large series of fungi and algæ (largely European exsiccatae) recently acquired. The Herbarium is rich in types of species described by Dr. Torrey, Professor Meisner, Dr. Chapman, Dr. Asa Gray, Mr. Austin, Professor Britton, Dr. Rusby, Dr. Morong, and Dr. Small. The various collections are all arranged in a single series, but each sheet is identified by a designative label or stamp. There are also extensive collections of fruits, seeds, woods, and material illustrating economic botany, placed in cases and drawers.

This direct connection of the department of Botany with the New York Botanical Garden makes access available, among other collections, to the Ellis collection of fungi, the largest accumulation of North American plants of this series in existence, rich in types of American species, as well as extended series of European exsiccatae. The private collection of the Professor of Botany, specially rich in pteridophytes, hepaticæ, and basidiomycetous fungi, is also accessible for study. The entire aggregation of collections thus available for students is exceptionally full in every group of plants from slime moulds to composites, and offers facilities for reference second to none.

The portion of the University Library classified under Botany, temporarily shelved in a special library room (508), will be deposited in the library stack-room of the Museum building in connection with the extensive supplementary collection now owned by the New York Botanical Garden. The current periodicals are to be filed in the large reading-room under the dome of the Museum building.

The University collection now contains about 4000 bound volumes, and about 5000 pamphlets and extracts. These numbers do not, however, represent the whole reference strength of the collection, for all general works, scientific journals, and publications of general scientific societies are shelved in

the main library. All the regularly published journals devoted to botany are received, and the sets of most of them are complete.

Publications

Two series of publications are issued from the department : a quarto series known as the *Memoirs of the Department of Botany*, of which two volumes have been published ; and the *Contributions*, in octavo, which have commenced the seventh volume.

CHEMISTRY

None of the courses in this department is open to women.

1—General inorganic chemistry—Introduction. Laws of chemical combination, history, occurrence, preparation, and properties of the elements and their principal compounds. Text-book : Newth's *Inorganic Chemistry*. Professor CHANDLER, Professor PELLEW, Dr. LAUDY, and Mr. WHITAKER

Required of all first-year students in the Schools of Mines, Chemistry, and Engineering. 3 lectures and 1 recitation, throughout the year.

Open as an elective to all classes in Columbia College. 3 lectures throughout the year, with 2 afternoons in laboratory practice, either the first or second half-year. [Course 6.]

Laboratory practice comprises the preparation, physical and chemical properties, and tests of the principal inorganic elements and compounds. Text-book : Pellew's *Laboratory Exercises in General Chemistry*. Professor PELLEW and Mr. WHITAKER

Required of Columbia College students who elect Chemistry 1.

2—General inorganic chemistry—Introduction. Laws of chemical combination, history, occurrence, preparation, and properties of the elements and their principal compounds. Text-book : Newth's *Inorganic Chemistry*. 2 lectures a week throughout the year. Professor PELLEW and Mr. WHITAKER

Laboratory practice comprises the preparation, physical and chemical properties, and tests of the principal inorganic elements and compounds. Text-book : Pellew's *Laboratory Exercises in General Chemistry*. 2 afternoon exercises in the laboratory and 2 conferences a week for half the year. Half the class during the first half-year ; the other half during the second half-year. Dr. VULTÉ, Dr. MATHEWS, and Mr. WATTERS

Required of first-year students in the School of Medicine. Open as an elective to seniors in Columbia College.

3—Physical chemistry. An introductory course in the theory of the behavior of substances in solution, as applied particularly to analytical methods. 2 hours a week, in lectures and recitations, during the second half of the second year and 1 afternoon a week in the laboratory. Text-books : Morgan's *Theory of Solution* and Ostwald's *Physico-chemical Measurements*. Dr. MORGAN

Required of all second-year students in the School of Chemistry. Open as an elective to seniors of Columbia College. Pre-requisite : Chemistry 1.

4—Physical chemistry. A course treating of the states of aggregation, solutions, ions in analytical chemistry, thermo-chemistry, chemical mechanics, and

electro-chemistry. 3 hours a week in lectures and recitations during the entire fourth year and 1 afternoon a week in the laboratory during the first half-year. Text-books: Morgan's *Elements of Physical Chemistry* and Oswald's *Physico-chemical Measurements*. Dr. MORGAN

Required of all fourth-year students in the School of Chemistry. Open as an elective to seniors of Columbia College, and to candidates for the degrees of A.M. and Ph.D. as a minor, or, with additional laboratory work, as a major subject. Pre-requisite: Chemistry 1.

5—Physical chemistry, advanced course,—2 lectures and at least 12 hours a week in the laboratory throughout the year. Original investigation and reports of new work from the journals. Dr. MORGAN

Open to candidates for the degree of Ph. D. as a major subject. Pre-requisite: Chemistry 1 and 4.

6—Experimental chemistry—Conferences and laboratory practice. Text-book: Pellew's *Laboratory Exercises in General Chemistry*. 2 afternoons per week for either half-year. Professor PELLEW and Mr. WHITAKER

Required of Columbia College students who elect Course 1.

7—Qualitative analysis—Lectures, conferences, and laboratory practice. Text-book: Wells' *Inorganic Qualitative Chemical Analysis*. 3 lectures or conferences a week, and laboratory practice. Dr. WELLS and Dr. LENHER

The laboratory practice for chemists, metallurgists, and mining engineers consists of 16 hours a week during alternate weeks; for electrical engineers, 13½ hours a week for alternate weeks; for mechanical engineers, 8½ hours a week for every week.

Required of first-year students in the Schools of Mines, Chemistry, and Engineering. Open as an elective to sophomores, juniors, and seniors in Columbia College. Pre-requisite: Courses 1 or 2.

8—The spectroscope as applied to qualitative and quantitative analysis—Laboratory practice and conferences with the instructors. 8 hours a week for one half-year. Professor RICKETTS and Dr. WELLS

Open to candidates for the degree of A.M. as a minor. Pre-requisite: Courses 1, 6, and 7.

9—Quantitative analysis—Text-books: Cairns' *Quantitative Analysis* and Fresenius' *Quantitative Analysis*. 4 hours lectures and recitations a week during the second year, and 15 hours laboratory practice. Professor RICKETTS and Dr. MILLER

Required of second-year students in the School of Chemistry and the course in Metallurgy. Open to candidates for the degree of A.M. as a major. Pre-requisite: Courses 1, 6, and 7.

11—Quantitative analysis, inorganic (short course)—Text-book: Miller's *Notes on Quantitative Analysis for Electrical Engineers*. 15 lectures and 60 hours laboratory practice during the first half-year. Dr. MILLER and Mr. HYDE

The class is divided into two sections. The first section has 2 lectures a week for the first half of the first half-year from October 3d to November 24th, and laboratory work for four weeks from October 17th to November 14th. The

second section has 2 lectures a week from November 29th to January 28th, and laboratory work from December 5th to January 16th.

Required of second-year students in the course of Electrical Engineering. Pre-requisite : Courses 1, 6, and 7.

12—Quantitative Analysis, inorganic—Text-book : Cairns' *Quantitative Analysis*. 2 lectures or conferences a week during first half of the second year, with laboratory practice 15 hours a week in alternate weeks during the entire year. Professor RICKETTS, Dr. MILLER, and Dr. JOUËT

Required of second-year students in the courses of Mining Engineering. Pre-requisite : Courses 1, 6, and 7.

13—Quantitative analysis—Proximate organic analysis. 2 lectures, 2 recitations a week, and laboratory practice second half of the third year. Chemists, analytical and organic, 16 hours a week ; chemists, industrial, 10 hours a week. Professor RICKETTS and Mr. HYDE

Required of third-year students in the School of Chemistry. Open to candidates for the degree of A.M. as a major. Pre-requisite : Course 9.

14—Special methods of commercial analysis—2 lectures a week throughout the year. Laboratory practice during the first half-year for students taking the course in Metallurgy, and the second half-year for students in the course of Analytical Chemistry. Professor RICKETTS, Dr. MILLER, and Dr. JOUËT

Required of fourth-year students in the courses of Analytical Chemistry and Metallurgy. Open to candidates for the degree of Ph.D. as a major, with laboratory work throughout the year. Pre-requisite : Course 9.

10—Advanced Inorganic Chemistry, with special reference to the rarer elements, and modern chemical theories.

One lecture a week throughout the year, at 9.30 A.M. on Saturdays. Dr. VICTOR LENHER

Open to advanced students.

15—Special and advanced methods in proximate organic analysis—Research, conferences, and laboratory work at least 20 hours a week, for one year. Professor RICKETTS and Mr. HYDE

Open to candidates for the degree of Ph.D. as a major. Pre-requisite : Courses 9 and 13.

16—Quantitative analysis, special or new methods, gravimetric, volumetric, or electrolytic—Conferences and laboratory work at least 12 hours a week for one or two years. Professor RICKETTS and Dr. MILLER

Open to candidates for the degrees of A.M. and Ph.D. as a major. Pre-requisite : Course 9.

17—Assaying—Ores and metallurgical products. Text-book : Ricketts' and Miller's *Notes on Assaying*. 2 lectures, 1 recitation a week, and laboratory practice. Professor RICKETTS, Dr. MILLER, and Mr. RIEDERER

Required of all third-year students in the courses of Mining Engineering, Metallurgy, and Chemistry. The laboratory work for the mining engineers includes 16 hours a week during alternate weeks throughout the year ; for metallurgists and analytical and organic chemists, 16 hours a week during the first half-year ; for industrial chemists, 11 hours a week during the first half-year. Open to candidates for the degrees of A.M. and Ph.D. as a minor.

18—Special methods of assaying ores, alloys, and furnace products—Comparison of methods and determination of losses. Conferences and laboratory work at least 8 hours a week for one half-year. Professor RICKETTS and Dr. MILLER

Open to candidates for the degree of A.M. or Ph.D. as a minor. Pre-requisite: Course 17.

20—Organic chemistry, elementary course—Subject treated in a popular manner. Instruction given on such important classes of compounds as the hydrocarbons, alcohols, ethers, organic acids, fats, waxes, soaps, cyanides, carbohydrates, alkaloids, coloring matters, drugs, perfumes, and the like. Text-book: Remsen's *Organic Chemistry*. 2 lectures and 1 recitation a week. Mr. BOGERT and Dr. HARPER

Required of all second-year students in the School of Chemistry. Minor for the degree of A.M. Open to seniors in Columbia College, and to any other students in Columbia University who are properly qualified. Pre-requisite: Course 1 or its equivalent.

30—Organic chemistry, elementary laboratory course—Devoted to the preparation of such simple substances as chloroform, iodoform, ether, urea, nitrobenzole, aniline, acetanilid, sulphanilic acid, carbolic acid, salicylic acid, decomposition and recombination of oil of wintergreen; perfumes, drugs, dye-stuffs, flavoring principles, being represented in the series. The student also makes a number of elementary analyses, and vapor-density determinations. Text-book: Noyes' *Organic Chemistry for the Laboratory*. 8 hours a week, both terms, in Organic Laboratory. Mr. BOGERT and Dr. HARPER

Minor for the degree of A.M. Pre-requisite: Courses 1, 3, 7, 9, and 20 (or, it may be taken at the same time with Course 20.)

21—General organic chemistry—A more thorough treatment of the subject, including discussion of all the more important classes of organic compounds. The student also prepares in the laboratory a large number of typical organic compounds, besides making elementary analyses and vapor-density determinations. Text-books: Bernthsen's *Kurzes Lehrbuch der organischen Chemie* and Noyes' *Organic Chemistry for the Laboratory*. During the first half-year, 3 lectures, 1 recitation, and 20 hours laboratory a week for all fourth-year students in the School of Chemistry; 2 hours conferences additional a week for fourth-year students pursuing the course in Organic Chemistry. During the second half-year, 2 lectures and 1 recitation a week, for fourth-year students pursuing the courses in Industrial or Analytical Chemistry; 2 hours conferences and 16 hours laboratory additional a week for fourth-year students pursuing the course in Organic Chemistry. Mr. BOGERT and Dr. HARPER

Required of all fourth-year students in the School of Chemistry. Major for the degree of A.M. Pre-requisite: Courses 1, 3, 7, 9, and 20.

22—Advanced organic chemistry, minor courses—Any one of the following subjects: (1) Physical properties of organic compounds as related to their molecular constitution; (2) Dissociation coefficients of organic acids; (3) The terpenes and camphors; (4) Synthetic alkaloids; (5) Synthetic perfumes; (6) Synthetic drugs; and such other subjects as may be selected. Personal instruction and laboratory work not less than 12 hours a week. Mr. BOGERT

Minor for the degree of Ph.D. Pre-requisite: Courses 1, 3, 7, 9, and 21.

23—Advanced organic chemistry, major course—Original investigation and research. Subject to be assigned or approved by the Instructor. Personal instruction, conferences, private study, and laboratory work. Mr. BOGERT

Major for the degree of Ph.D. Pre-requisite: Courses 1, 3, 7, 9, and 21.

24—Industrial chemistry, general course—The subjects discussed are:—(1) Air: nature, sources of contamination, sewer gas, plumbing, draining, disinfection, ventilation. (2) Water: composition of natural waters, pollution, disposal of sewage and house refuse. (3) Artificial illumination: candles, oils and lamps, petroleum, gas and its products, electric light. (4) Limes, mortars, and cements. (5) Building stones: decay and preservation. (6) Timber and its preservation: pigments, paints, essential oils, varnishes, preserving processes. (7) Explosives: gunpowder, gun-cotton, nitro-glycerine. (8) Glass and ceramics. (9) Electro-metallurgy. (10) Photography. Text-books: Park's *Hygiene* and Wagner's *Chemical Technology*. 3 lectures and 1 recitation a week. Professor CHANDLER and Professor PELLEW

Required of all second-year students in the Schools of Mines, Chemistry, and Engineering. Open to juniors and seniors in Columbia College. Pre-requisite: Course 1.

25—Industrial chemistry, special course—The subjects discussed are:—(1) Chemical manufactures: acids, alkalies, and salts. (a) Sulphur, sulphurous acid, hyposulphites, sulphuric acid, bisulphate of carbon. (b) Common salt, soda ash, hydrochloric acid, chlorine, binoxide of manganese, bleaching powder, chlorates, chlorimetry. (c) Carbonate of potash, caustic potash. (d) Nitric acid and nitrates. (e) Iodine, bromine. (f) Sodium, aluminum, magnesium. (g) Phosphorus, matches. (h) Ammonia salts. (i) Cyanides. (j) Alum, copperas, blue vitriol, salts of magnesia, baryta, strontia. (k) Borates, stannates, tungstates, chromates. (l) Salts of mercury and silver. (m) Oils, fats, soaps, and glycerine. (2) Food and drink: milk, cereals, starch, bread, meat, tea, coffee, sugar, fermentation, wine, beer, spirits, vinegar, preservation of food. (3) Clothing: textile fabrics, bleaching, dyeing, calico printing; paper, tanning, glue, india-rubber, guttapercha. (4) Fertilizers: guano, superphosphates, poudrettes. Text-books: Wagner's *Chemical Technology*; Lunge's *Manufacture of Sulphuric Acid and Soda*; Schultz' and Julius' *Kuenstlichen Organischen Farbstoffe*; Schultz' *Chemie des Steinkohlentheers*. 3 lectures and 1 recitation for two years, one half the subject being discussed each year. Professor CHANDLER and Professor PELLEW

Required of third- and fourth-year students in the School of Chemistry. Pre-requisite: Course 24.

26—Industrial chemistry, laboratory practice—Preparation of chemicals, including solution, filtration, evaporation, crystallization, and distillation, as used in factory practice. 3 afternoons a week during the first half-year. Professor PELLEW and Mr. TUCKER

Required of all third-year students in the School of Chemistry. Open to juniors and seniors in Columbia College. Open as a minor to candidates for A.M. Pre-requisite: Course 1.

27—Industrial chemistry, laboratory practice—Special applications: Textile industry, vegetable and animal fibres, bleaching, dyeing, and calico printing

3 afternoons a week during the second half-year. Professor PELLEW and Mr. TUCKER

Required of third-year students taking the course in Industrial Chemistry, and of fourth-year students taking the courses in Analytical and in Organic Chemistry. Open to juniors and seniors in Columbia College. Minor for the degrees of A.M. or Ph.D. Pre-requisite: Course 1.

28—Industrial chemistry, laboratory practice—Special applications: Petroleum; photometry; electro-metallurgy; and thesis work. 5 afternoons a week during the second half-year. Professor PELLEW and Mr. TUCKER

Required of fourth-year students taking the course in Industrial Chemistry. Open to seniors in Columbia College. Minor for the degree of A.M. or Ph.D. Pre-requisite: Course 1.

29—Industrial chemistry, advanced course—Original research; the study and investigation of methods and processes in sanitary and industrial chemistry. Personal instruction and laboratory work for one year. Professor PELLEW and Mr. TUCKER

Major for the degree of Ph.D. Pre-requisite: A knowledge of General, Analytical, and Industrial Chemistry.

Equipment

In Havemeyer the Chemical Department is provided with ample space for its museum, lecture-rooms, and laboratories, and every convenience has been provided for both the instructors and students working in the general or special courses.

There are five chemical lecture-rooms, all fully supplied with apparatus and instruments, and equipped with pneumatic troughs, gas, pressure, exhaust, and electricity. The large chemical lecture-room on the ground floor contains 316 seats. Underneath the rear of this room is situated a large storeroom for lecture apparatus, and connected with it are convenient rooms for preparing the lecture experiments.

The museum of General Inorganic and Organic Chemistry and of the Chemical Arts, a large and lofty room occupying the whole left wing of the ground floor, contains the elements and all their more important compounds; representative sets of specimens of all classes of organic compounds; materials and products illustrating the chemical arts, and numerous models, pictures, and diagrams illustrating the various branches of the science of chemistry.

The Qualitative and General Chemistry Laboratory is equipped with ninety-six desks, each divided into two sections, for use by different students, and each equipped with sink and water faucet, gas, exhaust, and electric light. The laboratory has been entirely refurnished with new and handsome sets of imported reagent bottles. In the General Chemistry Laboratory, the students of Columbia College and the other schools who select this course as an option, are taught, in a thorough manner, to prepare the more important elements and their inorganic compounds, and to study the principal physical and chemical properties of the same.

In the Qualitative Laboratory, principally used by the students in the Schools of Pure and Applied Science, the reactions of the various metals and salts are taught largely with a view to their separation and identification. The students

first learn the properties of the individual members of a single group of acids or bases. Then single members or mixtures of members of this group are submitted to them for identification; and finally, proceeding from simple to complex substances, they become able to determine the composition of the most difficult mixtures.

The Quantitative Laboratory is equipped with seventy-two desks, each one provided with gas, water, pressure, exhaust, and electricity, besides electric lights. The students first analyze substances of known composition, such as crystallized salts, so that they may constantly check the accuracy of their work by reference to the true percentage composition. Then they proceed to more complex analyses of materials that they would be apt to meet with in their actual practice, such as ores, metals, and minerals, and a great range of commercial articles, both organic and inorganic, such as gas, water, food products, and the like, which have been carefully analyzed so that their results may be properly checked. Attached to the main laboratory is a large and well-equipped balance room, containing accurate balances, and special rooms, which are now being equipped with the latest and most improved apparatus for gas, water, and electrolytic analysis.

The Organic Laboratory contains forty large and commodious desks, each one provided with water, gas, pressure, exhaust, and electricity. The laboratory is also provided with high- and low-pressure steam, and with special rooms for balances, pressure ovens, glass-blowing, combustions, and for advanced work in various directions. It is thoroughly equipped with all necessary apparatus and instruments for the determination of boiling-points, melting-points, specific gravities, vapor densities, for proximate and elementary analyses, and for the synthetic preparation of organic compounds.

The Laboratory of Industrial Chemistry is planned for the instruction of students in the practical operations of chemical manufactures and chemical industries, and in the solution of various important problems in sanitary chemistry and hygiene. It is equipped for the manufacture of pure chemicals from their raw materials on an industrial scale, with fine batteries of steam evaporators, and with steam stills, centrifugals, filter presses, crushers, and the like. It includes a dyeing laboratory supplied with a large stock of the most important natural and artificial dye-stuffs, and with all the regular equipment used in the practical testing of dyes, including a calico-printing machine. Connected with it is a photometer room, containing a new and complete outfit for the practical testing of illuminants. Among the other subjects in which practical instruction is to be given in this laboratory may be mentioned the filtration and purification of water and sewage, fermentation and distillation, the use of the electric furnace, and the manufacture of sugar, petroleum products, and leather.

The Laboratory of Physical Chemistry is well equipped with the most recent apparatus adapted to a wide range of experimental work in the branches of heat, light, and electricity as applied to chemical problems. The students take up the subject in the second year with special reference to the behavior of substances in solution. In their fourth year they resume the subject from a more advanced standpoint, and, with the aid of the higher mathematics, attack

problems of broader range and greater difficulty. Towards the end of their course a simple original investigation is undertaken, which, if successful, is published by the student.

The Assay Laboratory is provided with crucible and muffle furnaces, both gas and coal, for the fire assay of ores; also with crushing, pulverizing, and sampling machinery, balance-room, storeroom, and thirty-six well-equipped working desks. It also contains all the apparatus necessary for the wet assay of silver bullion and for laboratory tests of ores.

GEOLOGY

The lectures of courses 6-9 are open to women.

Collegiate Courses

1—General Geology—First half-year: Physical geology, with practical work in the rock collections under the lithological part of the subject. Second half-year: Stratigraphical and historical geology, involving laboratory work with type fossils and collections illustrating the geology of the United States. Text-books: Le Conte's *Elements of Geology* and Dana's *Manual of Geology*. 2 hours lectures, including laboratory work. Mr. HOLLICK

Elective to juniors and seniors in the College.

2—General Geology—A more elaborate discussion of the subjects treated in Course 1. Text-books: Scott's *Introduction to Geology*; Kemp's *Hand-book of Rocks*. 3 hours lectures, including laboratory work. Professor KEMP

Elective to seniors in the College who have not taken Course 1 and who have preparation in Mineralogy.

Courses 6, 7, 8, and 9 are open to women on the same terms as to men.

University Courses

3—Economic Geology—First half-year: A discussion of the general features and formation of ore bodies, followed by a description of the deposits of the ores of iron, copper, lead, zinc, silver, gold, and the lesser metals, with especial reference to North America. Second half-year: A description of the distribution and occurrence of coal, petroleum, natural gas, asphalt, building-stone, water supply, salines, and minor minerals. Text-book: Kemp's *Ore Deposits of the United States*, and lecture notes privately printed. 3 hours lectures and conferences. Professor KEMP

Required of all third-year students of the School of Mines. Elective for seniors in the College who have had Course 1 or 2, or an equivalent. Open, with two additional hours weekly of collateral reading, to candidates for the degrees of A.M. or Ph.D. whose minor subject is Geology.

5—Geology of Building-stones—2 lectures, or the laboratory equivalent, during the first half-year. Dr. JULIEN

Elective to graduate students.

6—Petrology—A discussion of the microscopic structure, mineralogical composition, and genetic relations of the igneous and metamorphic rocks. Pre-requisite: Optical Mineralogy. 2 hours lectures, 4 hours laboratory, or more. Professor KEMP

Open to candidates for the degrees of A.M. and Ph.D. whose major or minor subject is Geology. Given in alternate years with Course 8. Offered in 1899-1900.

7—Invertebrate Palæontology—A general description of invertebrate fossils, following the biological sequence. Pre-requisite: Course 1, department of Zoölogy. Text-book: Zittel-Eastman, *Text-book of Palæontology*. 2 hours lectures, 4 hours laboratory, or more. Mr. VAN INGEN

Open to candidates for the degrees of A.M. and Ph.D. whose major or minor subject is Geology. Given in alternate years with Course 8. Offered in 1899-1900.

8—Comparative Geology—A description and study of the geological formations in their areal distribution and time relations, taking up the various schemes of classification, the character of the rocks, the typical forms of life, and the upheavals and igneous intrusions of each period. Text-books: The *Correlation Bulletins* of the U. S. Geological Survey, Kayser's *Text-book of Comparative Geology*, and the manuals of Dana, Geikie, and De Lapparent. 2 hours lectures, and at least 4 hours laboratory and reading. Professor KEMP for the crystalline rocks, Mr. VAN INGEN for the sedimentary

Major or minor for A.M. or Ph.D. Given in alternate years with Courses 6 and 7. Not offered in 1899-1900.

9—Palæobotany—Study of fossil plants, following the biological sequence. Pre-requisite: Course 1 or 2, department of Botany; Course 1 or 2, department of Geology. Text-book: Zittel's *Handbuch der Palæontologie*, vol. ii, and Solms-Laubach's *Palæophytology*. 1 hour lecture or conference, 4 hours laboratory or reading for two years. Mr. HOLICK

Open to candidates for the degrees of A.M. and Ph.D. whose major or minor subject is Geology.

10—Geological Examinations and Surveys—A discussion of the methods of systematically recording and interpreting geological phenomena, and of the organization and scope of geological surveys on a large scale. This will be followed by a sketch of the history and results of state and national geological surveys in this and other countries, and of other sources of detailed information regarding local geology. 1 hour. Professor KEMP

Required of fourth-year students in the School of Mines, Geological option. Elective for seniors in the College who have had Course 1 or 2, or an equivalent. Elective for graduate students.

11—Metamorphism—A discussion of the processes and effects of metamorphism. 2 lectures, or the laboratory equivalent, during the second half-year. Dr. JULIEN

Journal Club and Seminar, conducted by the officers of the department weekly, as arranged by consultation.

NOTE—Attention is also directed to the allied courses in the departments of Mechanics and Zoölogy, in the former on Geodynamics, in the latter on Vertebrate Palæontology.

Geological Laboratories

The Geological Laboratories, Lecture-room, and Museums, occupy Rooms 101, 103, 301, 401, and 402, of Schermerhorn where they are classified as follows: Room 101 contains the collections and laboratory in invertebrate palæontology and stratigraphic geology. The chemical laboratory, the grinding room, and the main dark room are partitioned off from it. In Room 103 are the collections and laboratory of vertebrate palæontology and palæobotany. Room 301 contains the collections in economic and inorganic

geology. Room 401 is the general laboratory, specially utilized for petrographical work. Room 402 is the lecture-room, and in 404 is the departmental library. The laboratory in 401 contains collections illustrative of the different kinds of rocks, which are adapted to conferences in the course of general geology. There is also a much larger series of rocks embracing nearly all the rarer species and structures, which are used for advanced work in microscopic petrography. Parallel series of thin sections are provided for these, as are microscopes and other necessary apparatus for study, instruction, and investigation. A machine for grinding thin sections of rock, a photographic laboratory, and a chemical laboratory are in Room 101.

There are study collections accessible to the students which illustrate the various geological formations and type fossils, and which are used in the lectures and conferences on stratigraphical and historical geology. A very complete series illustrating the ore deposits, associated geological formations, and useful minerals of North America is similarly employed in the lectures on economic geology. The library of the late Professor Newberry is deposited with the department, and affords a quite complete series of geological reports and books of reference. In all the courses a large and continually increasing series of lantern slides is employed with an electric lantern.

SUMMER SCHOOL

The Trustees of the University have made an appropriation for a Summer School in Geology, which defrays the expenses of a small squad of advanced students for about one month each summer, with the Professor of Geology. During the college year excursions are offered to points of geological interest near New York on all Saturdays and holidays of the fall and spring. Few localities afford so extensive and so accessible exposures as the vicinity of New York.

The Museums in Charge of the Geological Department

General and Economic Geology, Palæontology

The Museums of the department are located in the west wing of Schermerhorn Hall, on the two lower floors. The general policy which is pursued in their management is to make them less places of display than working rooms, with much the same functions as the departmental library. Alcoves for the officers of the department and for graduate students will be reserved when necessary, near to groups of ores, rocks, or fossils, which may be under investigation.

On the second floor of Schermerhorn Hall (or the ground floor as one enters from the south), and in the west wing, are located the collections illustrative of dynamical and structural geology, and of mineral resources or economic geology. In the former, models and rock specimens exhibit the materials of the earth's crust, and the disturbances, alterations, sculpturing and the like, to which they are subjected. In the latter, the ores of the various metals, in typical specimens, are shown in glass cases, while in drawers below will be found collections illustrative of the local geology of the productive districts. The same method is pursued for the non-metallic minerals.

The department is also gradually accumulating a collection of relief maps and models which will serve for future work in Physiography, when that branch of the subject can be given special attention. The collection will find lodgment, likewise, in this room.

In the west wing of the basement are the Museums and Laboratory of

Palæontology

The collections are arranged in two series, stratigraphical and biological. The stratigraphical series includes the sets of fossils characteristic of the different geological systems and groups, together with specimens of the rock formations. The larger part of this series is made up of a collection intended to show the succession of the various faunas that have inhabited the North American province in past time. The biological series illustrates the phylogeny of the several classes and races of invertebrate animals from their earliest fossil representatives down to the modern living forms. The arrangement is biological, living species being inserted in their proper taxonomic relations.

At the north end of this museum tables are provided for the work in stratigraphic geology and palæontology.

The basement room, under the large lecture-room that projects on the north side of Schermerhorn Hall, is devoted to the collections of fossil plants and fossil fish, in which the University is especially rich. Working tables and places are provided for instructors and students engaged in these departments of investigation.

Special attention should be called to recent accessions of works on palæobotany. Nearly all the principal dissertations and monographs in this branch of palæontology are now in the library, which, taken in connection with the extensive series of museum specimens, offer opportunities for research in fossil botany second to none in the country.

By arrangement with the American Museum of Natural History, advanced students in the University receive special privileges at the former, to whose wealth of geological and palæontological material reference is elsewhere made in this circular.

MATHEMATICS

All the following courses are open to women on the same terms as to men.

21—Advanced calculus. 3 hours. Professor FISKE

For A.M. and Ph.D.

22—Differential equations. 3 hours. Mr. KEYSER

For A.M. and Ph.D.

23—Theory of functions of a complex variable. 3 hours. Professor FISKE

For A.M. and Ph.D.

24—Riemann's theory of functions, including elliptic functions. 3 hours.
Professor COLE

For A.M. and Ph.D.

Not given in 1899-1900.

25—Theory of invariants. 3 hours. Dr. COLE

For A.M. and Ph.D.

27—Analytical theory of curves of double curvature and curved surfaces. 3 hours. Mr. MACLAY

For A.M. and Ph.D.

28—Theory of Abelian functions. 3 hours. Professor FISKE

For A.M. and Ph.D.

Not given in 1899-1900.

31—Functions defined by linear differential equations. 3 hours. ———

For A.M. and Ph.D.

Not given in 1899-1900.

32—Theory of groups. 3 hours. Professor COLE

For A.M. and Ph.D.

Equipment

In the equipment of the department of Mathematics is a large number of models, charts, and instruments. An elaborate set of models illustrates the metric system of weights and measures. A set of about fifty models of elementary solid and spherical geometry is intended to exemplify the demonstrations contained in Davies' *Legendre*. These are made of cherry wood with markings in inlaid ebony, and are of unusually large size. There are several similar models representing the different plane sections of the cone. A series of wooden models, constructed by Schroeder of Darmstadt, illustrates elementary solid geometry, and contains, in addition, examples of all the different forms of the surfaces of the second order. There is a series of models of descriptive geometry, also constructed by Schroeder. The horizontal and vertical projections are traced upon boards solidly joined together at right angles and of convenient size to allow in general the representation of three different models, or of three different views of the same model. The form and construction suggest a division of these models into two classes: (1) the representation in metal of lines and surfaces, adjusted upon axes, the projections of several of their positions being given; (2) the representation of solid bodies in hard wood, including the exhibition of their plane sections in various directions and the intersections of different surfaces and solids.

A collection of models, which was presented to the department by President Low, having been purchased by him from the German University Exhibit at the Chicago Exposition in 1893, illustrates analysis situs, theory of functions of a complex variable, surfaces of higher order, their singularities and curvature, and line-geometry.

A series of charts illustrates the theory of plane algebraic curves, especially those of the fourth order, the resolution of higher plane singularities into equivalent elementary singularities, the expression of functions by means of infinite series and infinite products, and conformal representation by means of algebraic and elliptic functions.

The collection of mathematical works in the Library of the University is especially rich in treatises and in sets of collected works of mathematicians. All the mathematical journals of importance are regularly received, and the Library possesses complete sets of most of them.

MECHANICS

Courses 3, 5, and 10-18 are open to women on the same terms as to men.

Collegiate Courses

1—Analytical Mechanics. As a text for this subject, Rankine's Applied Mechanics is used—attention being confined chiefly, however, to Part I, Principles of Statics (including hydrostatics); Part III, Principles of Kinematics; and Part V, Principles of Dynamics (including hydrodynamics). The text is supplemented by lectures on special topics, by written solutions and discussions of typical problems, and by demonstrations with the aid of apparatus. Particular attention is given to the doctrine of units and dimensions of units, and to problems affording actual applications of principles. 3 hours, first and second half-year. Professor WOODWARD

Required of all students in Engineering; and it is recommended to all students who may desire to pursue the higher applications of the science in dynamical astronomy, electricity, magnetism, thermodynamics, elasticity, and physical geodesy.

2—Elementary Mechanics. Loney's Elements of Statics and Dynamics is used as a text. This work is supplemented by demonstrations with apparatus, by lectures on the theory of dimensions and units, and by lectures, chiefly historical, on the higher applications and results of the science. 2 hours, first and second half-year. Mr. PFISTER

Offered especially as an elective to students of the Junior year in the College. It is designed to afford as good a knowledge of the science as can be had without the calculus. It assumes that the student has passed in Course 1 of the the department of Mathematics, or its equivalent.

University Courses

3—Theoretical Mechanics. This requires familiarity with the elements of the differential and integral calculus. 2 hours, first and second half-year. Mr. PFISTER

Designed to be supplementary to Course 2, and is offered as an elective to those desiring a knowledge of the general principles of the science rather than the special principles essential to engineering.

4—Thermodynamics, with special reference to its bearing on the theory of heat engines. 3 hours, second half-year. Professor PUPIN

Required of all students in Engineering.

5—Elementary Thermodynamics and Hydromechanics. Thermodynamics, 2 hours, first half-year; Hydromechanics, 2 hours, second half-year. Mr. PFISTER

Offered as an elective to students of the fourth year in the College, and to graduates. Its pre-requisite is Course 2, or an equivalent.

6—Theory of Dynamo and Motor (Introductory), covering elements of the theory of electric, magnetic, and electro-dynamic potential, theory of electro-magnetic and electro-dynamic induction, and its application to the theory of an ideal dynamo. 3 hours, first half-year. Mr. FREEDMAN

Required of students in Electrical Engineering.

7—Theory of Direct-current Dynamo and Motor, covering Hopkinson's theory of dynamo and motor designing, and Froelich's method of dynamo and motor testing. 3 hours, second half-year. Professor PUPIN and Mr. FREEDMAN

Required of students in Electrical Engineering.

8—Theory of Alternators and Transformers. 3 hours, first half-year. Professor PUPIN

Required of students in Electrical Engineering.

9—Theory of Variable Currents, particularly the theory of polyphase and of high frequency and high potential currents. 3 hours, second half-year. Professor PUPIN

Required of students in Electrical Engineering.

NOTE—Courses 1, and 3 to 9 may be pursued as minors for the degrees of A.M. and Ph.D. by candidates who have not taken such courses in undergraduate work. Two hours per week for one year constitutes a minor for the degree of A.M., and two hours per week for two years a minor for the degree of Ph.D.

Time equivalent to three hours per week for two years devoted to Courses 10 to 18 is required as a major for the degree of Ph.D., and three hours per week for one year as a major for the degree of A.M. For a minor for the degree of Ph.D. a time equivalent to two hours per week for two years is required.

10—Advanced Theoretical Mechanics. General principles of kinematics, statics, and kinetics; methods of Lagrange, Hamilton, and Jacobi; application of the doctrine of energy to the interpretation of mechanical phenomena. Lectures, 2 hours, first and second half-year. Professor WOODWARD

11—Theory of the Potential Function. General exposition of theory; derivation of equations of Laplace and Poisson, and theorems of Gauss, Green, and Stokes; with applications to problems in gravitation, hydromechanics, static electricity, and terrestrial magnetism. Lectures, 2 hours, first and second half-year. Professor WOODWARD

12—Geodynamics. Amount and distribution of the earth's mass; phenomena of precession, nutation, and oceanic tides; variation of density, gravity, and pressure within the earth; thermal properties, and secular contraction; mechanics of crumpling and crust movements. Lectures, 2 hours, first and second half-year. Professor WOODWARD

13—Mathematical Theory of Elasticity. Analysis of stresses and strains and expression of strains in terms of stresses; discussion of potential energy of strained media and the constants essential to define them; theory of wave motion in elastic media, with applications to sound and light. Lectures, 2 hours, first and second half-year. Professor WOODWARD

14—Maxwell's Theory of Electricity and Magnetism. Lectures, 2 hours, first and second half-year. Professor PUPIN

14a—Theory of Bessel's Functions and Spherical Harmonics. Lectures, 1 hour, first and second half-year. Professor PUPIN

15—Electro-Magnetic Theory of Light. Theory of dispersion, absorption and polarization. Lectures, 3 hours, first half-year. Professor PUPIN

16—Advanced Thermodynamics, including its applications to thermo-electricity and thermo-magnetism, physical chemistry, and calorific engines. Lectures, 2 hours, first and second half-year. Professor PUPIN

17—Theory of Oscillations. 2 hours. Professor PUPIN

18—Theory of the Conduction of Heat in Solids; with applications to spheres, cylinders, and parallelopipeds. Lectures, 2 hours, first and second half-year. Professor WOODWARD

MINERALOGY

The lectures of courses 7, 9, 10, and 11 are open to women.

1—Blowpipe analysis—The tests for 40 elements and the qualitative analysis of minerals, alloys, and slags. Two afternoons a week laboratory, one half-year. Professor MOSES, Dr. LUQUER, and Mr. WHITLOCK

Required of first-year students in the Schools of Mines and Chemistry. Open to students in the College who have taken Chemistry 1.

2—Crystallography—History, general characters, laws, forms, simple measurements, and calculations. 2 hours lectures and conferences, one half-year. Professor MOSES

Required of first-year students in the Schools of Mines and Chemistry. Open to students in the College who have taken Physics 1.

8—Physical crystallography—Short laboratory course in determination of physical characters of crystals. 1 hour, one half-year. Professor MOSES

Required of fourth-year students in Organic Chemistry. Pre-requisite: Course 2, or equivalent.

3—General mineralogy—First half-year: definitions, principles, and laws, crystal forms, appearance and properties of common minerals, practical determination of minerals. Second half-year: physical properties of crystalline substances with practice in elementary determination of physical constants and measurement and delineation of geometric form. 2 hours lectures, 1 afternoon laboratory. Professor MOSES

Open to students in the College who have taken Chemistry 1 and Physics 1.

4—Descriptive and determinative mineralogy—Study of 200 important species, their properties, uses, and methods of determination. 2 hours lectures, 3 hours laboratory, second half of first year and first half of second year. Professor MOSES and Dr. LUQUER

Required of first- and second-year students in the Schools of Mines and Chemistry. Open to juniors in the College and to candidates for the degree of A.M. or Ph.D. in their first year, whose minor subject is Mineralogy. Pre-requisite: Courses 1 and 2.

5—The minerals of building-stones—Study of common species, their properties, methods of determination, and their economic effect on building-stones. 2 hours lectures, and conference. Dr. LUQUER and Mr. WHITLOCK

Required of second-year students in the course of Civil Engineering. Open to students in the College who have taken Chemistry 1, and to candidates for the degree of A.M., as a half-minor course.

6—Optical mineralogy—Principles, apparatus, and distinguishing characters of minerals in thin sections. 2 hours lectures and 1 afternoon for two months. Dr. LUQUER

Required of second-year students in the School of Mines. Open to candidates for the degree of A.M. as a half-minor course, supplementing Course 5, and to students in the College. Pre-requisite: Course 5, or equivalent.

7—Optical mineralogy—Longer course, including principles, apparatus, and distinguishing characters of minerals in sections; determination of optical constants; study of microstructure; microchemical tests; separation of constituents and preparation of sections. 12 hours for one year, or 6 hours for two years. Dr. LUQUER

Open to candidates for the degree of A.M. whose major subject is Mineralogy, and to candidates for the degree of Ph.D. whose minor subject is Mineralogy. Pre-requisite: Course 3, or equivalent.

9—Physical crystallography—Optical, thermal, electric, and magnetic properties of crystals, with experiments; the geometric form with measurement and delineation; the effects of mechanical forces; theories of structure. 2 hours lectures, 1 afternoon laboratory. Professor MOSES

Open to candidates for the degree of A.M. whose major subject is Mineralogy, and to candidates for the degree of Ph.D. whose minor subject is Mineralogy.

Pre-requisite: Course 3, or equivalent.

10—Physical crystallography—Longer course, including study of the crystals of some group. 12 hours for two years. Professor MOSES

Open to candidates for the degree of Ph.D. whose major subject is Mineralogy. Pre-requisite: Course 3, or equivalent.

11—Mineralogy—Study of assigned group or species. Professor MOSES

Open to candidates for the degree of Ph.D. whose major subject is Mineralogy. Pre-requisite: Course 3, or equivalent.

NOTE

Course 7 is especially a minor course for geologists, Course 8 a minor course for chemists, and Courses 9 and 10 major courses for mineralogists.

Laboratories

The work of the students in the college courses and in general mineralogy is performed in the blowpipe laboratory, a large room with conference tables and seats for about seventy-five men, and in the adjoining lecture room, in which are the student collections of crystal models and minerals. Students in optical mineralogy use a separate room with north light, and for crystal measurements and monochromatic light determinations there is provided a large room subdivided by dark curtains.

The department is equipped for work in the university courses offered.

Collections

The Mineralogical Collection consists of about 35,000 labelled specimens, and includes a systematic collection, an economic collection of ores, building materials, and minerals used in chemical industries, a collection illustrating the genesis and alteration of minerals, a collection illustrating the character of

minerals, and small collections of artificial minerals, and New York City minerals. There are in the lecture and conference room a separate student collection, and a lecture collection. Several thousand unlabelled specimens are used in determinative work. The department possesses also about 600 sections of minerals, and 1500 crystal models in wood and glass.

Among the collections of minerals that have been presented to the department from time to time are some that possess historic value, among which may be mentioned the Gillmore collection, made in Paris under the direction of the Abbé Haüy, and presented by the late Gouverneur Kemble of West Point; a collection of Schulsberg (Wis.) stalactites, exhibited at the Sanitary Fair; a fine suite of Russian minerals, presented in 1869 by the Czar; a collection of American minerals, presented by the late Geo. T. Strong; two of the finest cerussites in the world, the Julien collection of minerals from Chesterfield, Mass.; the famous collection of Professor How, of King's College, Nova Scotia, and a very valuable collection made by Dr. Egleston in Japan.

In addition, a large number of gifts have been received, and these have been supplemented by careful purchasing and exchanging.

Dr. Egleston has recently presented his personal collection of about 6000 specimens.

PHYSIOLOGY

None of the courses in this department is open to women

1—General physiology—Structure of protoplasm; physiology of the cell; physiological division of labor and evolution of special functions; irritability; contractility; phototaxis; geotaxis; chemotaxis; galvanotaxis; general principles of secretion; the nerve cell; the nerve impulse; reflex action; the germ cells. Lectures, 1 hour. Professor LEE

Open to qualified candidates for the degree of M.D.

Open as an elective to seniors in Columbia College who have had at least one year of general biology, and, in conjunction with Course 2, to such seniors and to qualified candidates for the degree of A.M. or of Ph.D.

2—Laboratory course in general physiology. 5 hours. Professor LEE and Dr. STEWART

Open to qualified candidates for the degree of M.D., and, in conjunction with Course 1, to seniors in Columbia College who have had at least one year of general biology, and to qualified candidates for the degree of A.M. or of Ph.D.

3—The physiology of man as related to that of other mammals and of lower vertebrates—This course treats in alternate years of (a) the physiology of nutrition and (b) the physiology of the muscular and nervous systems and the special senses. Certain introductory lectures are repeated annually. Lectures and demonstrations, 4 hours. Professors CURTIS and LEE and Dr. STEWART

Required, in the first and second years, of candidates for the degree of M.D.

Open as an elective to seniors in Columbia College, and, in conjunction with Course 4, to qualified candidates for the degree of A.M. or of Ph.D.

4—Laboratory course in special physiology. 3 hours. Professors CURTIS and LEE and Dr. STEWART

Open to qualified candidates for the degrees of M.D., A.M., and Ph.D.

Research

The laboratory is open for research, under the direction of its officers, to advanced workers.

Fellowships

For the Alumni Association Fellowships open to graduates of the College of Physicians and Surgeons desiring to do special work in the department of Physiology, see the University Catalogue.

Marine Laboratory

An investigator's room at the Marine Biological Laboratory at Wood's Holl, Mass., has been provided by the University for the use of the Department of Physiology. This renders possible, during the summer, researches upon the physiology of the marine fauna.

Equipment

The department of Physiology possesses :

- (1) A laboratory, for research and the preparing of demonstrations, covering 1769 square feet and lighted on three sides.
- (2) A small laboratory for histological research with special reference to physiological problems.
- (3) Two rooms for optical or psychological work or for photography, communicating with the main research laboratory and with one another. One of these has a free southern exposure for the heliostat.
- (4) Two private laboratories for the professors of the department.
- (5) A laboratory for practical instruction.
- (6) A room for lectures and demonstrations to limited classes.
- (7) Easy access to a large lecture-room specially fitted for experimental teaching.
- (8) The Swift Physiological Cabinet, for the accommodation of a specially endowed and very full collection of apparatus of precision, mainly for research.

The physiological journals in English, German, and French are accessible at the laboratory to advanced students ; also the most important monographs and other books both modern and ancient.

A skilled mechanic is employed to devote his entire working time at the laboratory to the care and improvement of the plant, including the making, altering, and repairing of special apparatus. He also assists in the scientific manipulations. The following machines and apparatus deserve mention :

An upright seven-horse-power steam-engine, mounted against a pier upon an iron bracket to avoid vibrations, and working a shaft which runs the whole length of the main research laboratory ; electric motors and shafting in the laboratory for practical instruction and in the demonstration room ; two steam lathes, apparatus worked by motors for artificial respiration ; Ludwig's "Schlagwähler" ; kymograph for a long roll of paper, and high-speed drum kymograph, both worked by steam ; high-speed drum kymograph, worked by weights ; two drum kymographs of the spring pattern ; eight high-speed drum kymographs, worked by an electric motor ; Hürthle's kymograph for a very long

band of smoked paper ; two simple drums, to be revolved by hand ; four "Basel stands" for the fine adjustment of recording levers ; Zeiss scales and other instruments for reading and measuring curves, including a planimeter ; electromagnetic chronographs and control hammer ; seconds pendulum ; interrupter clock ; Jaquet's recording chronometer ; automatic dry-contact tuning-forks ; short-beam quantitative balance ; copper voltameter ; milliampère- and ampère-meters ; Wiedemann-du Bois galvanometer, with coils of high and low resistance, Haüy's bar, telescope, and milk-glass scale ; capillary electrometers ; ohmmeter, for resistances of from 0.001 to 200,000 ohms ; Edelman's faradimeter ; thirteen horizontal and two upright du Bois induction coils ; a complete collection of du Bois-Reymond's other apparatus ; moist chambers and muscle-levers ; upright rheochord ; mechanical tetanomotor ; differential rheotome ; Marey's tambours, cardiographs, stethograph, and explorer of the human muscles ; sphygmographs ; plethysmograph ; oncometers ; three single and one double recording mercurial manometers ; spring manometer of Fick ; manometers of Hürthle ; tonographs of von Frey ; "Stromuhr" ; frog-heart apparatus ; thermoelectric apparatus ; constant-pressure injection apparatus ; two mercurial gas pumps ; large spectroscope ; direct-vision spectroscopes ; Ladd spectroscope ; four micro-spectroscopes ; heliostat ; sixteen microscopes and accessories ; Zeiss's, Leitz's and Westien's dissecting microscopes ; Thoma's microtome ; Anschütz's "Schnellseher" ; numerous instruments and models for the investigation and demonstration of the physiology of sight and hearing ; casts and models of the brain ; Dalton's apparatus for making sections of the human brain.

PHYSIOLOGICAL CHEMISTRY

None of the courses in this department is open to women.

Two similar courses in physiological chemistry are given during the year : one course to half the class during the first half-year, the other course to the remaining half of the class during the second half-year.

It is the aim of the course to have the lectures, conferences, and laboratory exercises so conducted that the student will be enabled to carry out experiments in the laboratory on the various topics under consideration in direct connection with the didactic instruction.

The course opens with a study of proteid substances with special reference to their chemical nature, relationships, reactions, and the like. The general nature of cell protoplasm, together with the cell nucleus and the contained nucleins, is then considered from a chemico-physiological standpoint, after which the various forms of epithelial and connective tissues are studied. Next in order come the muscular and nervous tissues, the several characteristic constituents being separated and their chemical and physiological properties noted. Attention is then directed to the chemical processes of salivary, gastric, pancreatic, and intestinal digestion, special stress being laid upon the various forms of enzyme action here represented, the conditions under which such action takes place being carefully studied, and the resultant products separated and compared both from a chemical and physiological standpoint.

Other topics to be taken up are the liver, glycogen, and bile, with special reference to their physiological properties, blood, lymph, milk, and urine.

With regard to the latter excretion special emphasis is laid upon its chemical composition both in health and disease, and due regard is had to the teaching of proper methods for the detection of abnormal constituents. Further, quantitative methods for the determination of total nitrogen of both urine and fæces are carefully considered in their bearing on the study of nutrition.

It is the aim of the course to present to the student, as thoroughly as the time will allow, the chemical side of physiology and mainly from a scientific standpoint, without, however, ignoring those practical questions which have special significance for the student of medicine. It is believed, however, that too much stress cannot be laid upon the purely chemico-physiological problems of digestion, secretion, and nutrition in general, and that such a study, though seemingly dealing with many questions not directly connected with clinical problems, constitutes a very essential part of that training necessary for a complete understanding of the normal processes of the body. 1 hour lecture, Professor CHITTENDEN, 1 hour conference and recitation, 6 hours laboratory Dr. GIES and Assistants.

Required of all candidates for the degree of M.D. in their second year. Open as an elective to qualified seniors who have had the requisite amount of chemistry, physiology, and general biology, as well as to properly qualified candidates for the degree of A.M. or of Ph.D.

Research

The laboratory is open to advanced workers and for original research in physiological chemistry under the direction of its officers.

Professor CHITTENDEN, Dr. GIES, and Assistants.

Equipment

The department of Physiological Chemistry is located at the Medical School and possesses a well-equipped laboratory capable of accommodating 72 workers at one time. In addition there is a smaller laboratory for special work, together with private rooms for the instructors. The laboratory is well supplied with all necessary chemical apparatus, balances, steam-baths, constant level water-baths, thermostats for artificial digestions, microscopes for micro-chemical work, spectroscopes, polariscope, centrifugal apparatus, and the like; in fact, the laboratory is well equipped with all needful apparatus for routine and research work in physiological chemistry.

PHYSICS

Course 8 is open to women on the same terms as to men.

1—General Physics. Light and heat (first half-year). Sound and electricity (second half-year). Lectures and recitations, 3 hours; laboratory, 2 hours. Professor ROOD and Mr. GORDON

Laboratory work not required of first-year students in courses under the Faculty of Applied Science, with the exception of those in the course of Mechanical Engineering. Open to students in the College.

2—Magnetism and electricity (first half-year). Sound (second half-year). 2 hours lectures; 2 or 6 hours laboratory work. Text-books: Atkinson's *Ganot*, and Stewart and Gee's *Physics*. Professor ROOD

Open to Candidates for the degree of A.M. whose minor subject is Physics.

3—Units and measurements (first half-year). Lectures on the absolute system of mechanical and electrical units ; electrical measurements ; the derivation and use of the Watt, Joule, Ampère, Volt, and Ohm.

Exact electrical measurements (second half-year). Lectures on the Farad, Coulomb, and units of electric and magnetic induction.

Electrical and magnetic measurements in the laboratory. 2 hours lectures ; 2 to 8 hours laboratory. Text-books : Everett's *C. G. S. System of Units*, Glazebrook and Shaw's *Physics*, Kohlrausch's *Physical Measurements*, Wiedemann and Eberts' *Physics*, and A. Witz's *Physics*. Professor HALLOCK

Required of second-year students in the Electrical Engineering course. Second-year students in all courses under the Faculty of Applied Science, except that of Architecture, are required to attend the lectures of the first half-year, and to take two hours of laboratory work during the whole year. Open to candidates for the degree of A.M. whose minor subject is Physics. Pre-requisite : Course 1 or 2 with two hours laboratory work.

4—Light (first half-year). Lectures on the velocity, reflection, refraction, and dispersion of light. Achromatism, optical instruments, the eye, and Young's theory of color. Physical measurements in the laboratory.

Heat (second half-year). Lectures on the expansion of solids, liquids, and gases ; on conduction, specific heat, tension of vapors, and radiant heat. Physical measurements in the laboratory. 3 hours lectures, 2 or 4 hours laboratory work. Text-books : Stewart and Gee's, and Glazebrook and Shaw's *Physics*. Professor ROOD

Open to candidates for the degree of A.M. whose minor subject is Physics. Pre-requisite or parallel : Course 2.

5—Modes of designing and constructing apparatus (first half-year). 1 hour. Professor HALLOCK

Open to second-year students under the Faculty of Applied Science, and to university students. Pre-requisite or parallel : Course 2, 3, or 4.

6—Elementary meteorology (first half-year). The steam-engine (second half-year). 1 hour. Mr. GORDON

Pre-requisite or parallel : Course 2 or 4.

7—Electrical manipulation (first half-year). 1 hour. Theoretical comparison of electrical methods (second half-year). 2 hours. Mr. PARKER

Open to candidates for the degree of Electrical Engineer, and to university students. Pre-requisite or parallel : Course 3 or 4.

8—Undulatory theory of light (second half-year). 2 hours. Professor HALLOCK

Open to university students. Pre-requisite or parallel : Course 4 of seven hours.

Courses 2 to 13 are open to properly qualified students in the College.

31—General physics (shorter course for students in medicine). 3 hours lectures and 3 hours laboratory work, for a half-year. Professor HALLOCK

This course is delivered twice every year, and is required of candidates for the degree of M.D. in their first year.

Laboratory Courses

9—Electromotive force of standard and constant cells

10—Study of strength of electric currents

32—Absorption of sound by various materials

12—Colorimetry, and absorption spectra

13—Photometry

Open with five hours laboratory work, to candidates for the degree of A.M., or, with eight hours laboratory work, to candidates for the degree of Ph.D. whose minor subject is Physics. Pre-requisite: Course 2 of eight hours.

14—Calibration of Wheatstone bridges

33—Factors of capillarity

16—Determination of index of refraction by special methods

17—Quantitative examination of the discharge of the induction coil

18—Viscosity of solids

Open to candidates for the degree of A.M., or, with ten hours laboratory work, to candidates for the degree of Ph.D., in their first year, whose major subject is Physics. Pre-requisite: Courses 2 and 4 of eight and seven hours.

19—Galvanometer construction for maximum efficiency

20—Advanced course in spectrometry

21—Ballistic-galvanometer work, inductance

22—Calorimetry

23—Radiant heat

24—Interference of light

25—Polarized light

26—Acoustic measurements

27—Thermo-electricity

28—Measurement of low resistance

29—Electrical insulation

30—The use of the microscope

Professors ROOD and HALLOCK, Dr. TUFTS, and Mr. TROWBRIDGE

Open, with ten hours laboratory work, to candidates for the degree of Ph.D., in their first year, whose major subject is Physics. Pre-requisite: Courses 2 and 4 of eight and seven hours.

Original research, conducted under the direction of Professors Rood and Hallock, is open to properly qualified persons, including candidates for the degree of Ph.D., in their last year, whose major subject is Physics.

Equipment

The laboratories and lecture rooms of the department of Physics occupy four floors of Fayerweather on the eastern side of the university grounds. The building is supplied with all ordinary conveniences, including electricity for power and light, compressed air, and steam. There is a vertical shaft 95 feet high, with gas, electric, and water outlets at every ten feet. In the sub-basement a constant-temperature room is placed twelve feet below the surface of the ground. The meteorological instruments presented to the University by President Low are set up with the recording portions in the small library on the second floor, and are connected by an electric cable with the vanes, anemometer, and rain-gauge, which with allied pieces of apparatus are placed upon an observation platform located on the roof of the building. There are two lec-

ture rooms, a library, an apparatus room, and a small laboratory on the first floor, while the remaining three floors devoted to the department are occupied by laboratories of different kinds.

The general elementary laboratory includes in its equipment : three linear and three circular dividing engines of different designs ; a Geneva Society comparator, and dividing engine ; a Grunow cathetometer, spherometers, optical levers, calipers, and micrometers of many kinds, eight balances with weights. Specific-gravity apparatus, hydrometers, areometers, Becker and Jolly balances : standard mercurial barometers, aneroid and Mariott barometers, Kater's and Borda's pendulums, and apparatus for studying elasticity are provided ; also monochords, Kundt's dust-figure apparatus, and sets of organ pipes and tuning-forks for the study of sound ; thermometers and apparatus for their calibration, zero and boiling points are supplied ; also there is apparatus for determination of co-efficients of expansion, for latent and specific heat, and for calorimetry.

The optical rooms are furnished with eight spectrometers of different designs, five spectroscopes, small telescopes, opera-glasses, microscopes, sets of lenses, prisms, and gratings, goniometers, a sextant, optical benches, photometers, saccharimeters, total reflectometers, and apparatus for colorimetry, polarized light, and spectroscopy.

In the rooms devoted to electricity are nine galvanometers of various patterns, high and low resistance, ballistic and dampened ; electrometers, magnetometers, rheostats and bridges of all types ; condensers, batteries, keys, arc and incandescent lamps, ammeters and volt meters, and four standard ohms.

The workshop is furnished with a lathe, planer, grinding head, vises, carpenters' and machinists' benches, and tools for work in metal, wood, and glass.

Advanced students are taught and encouraged to repair, alter, and construct apparatus needed for their special work.

ZOOLOGY

The lectures of courses 5, 6, 7, 8, 9, 9a, 10, 10a, 12, 12a, 14, and 15 are open to women.

The courses in this department are mainly elective, and lead to the degrees of A.B., A.M., and Ph.D. They consist of lectures followed by practical work in the laboratory, and are arranged consecutively, advancing from instruction belonging properly to a liberal education up to the most advanced and special work.

The lecture and laboratory courses are conducted upon the fourth floor of Schermerhorn.

A—INTRODUCTORY BIOLOGICAL COURSES. Courses 1 and 2 give an introduction to the principles of animal biology as part of the general education of scientific and academic students. 2 is a biological course especially designed, first, for college students electing science for purposes of general culture ; second, as an introduction to more advanced courses in zoölogy, botany, and physiology ; and, third, as preparation for students intending to study medicine.

B—INTERMEDIATE ZOÖLOGICAL COURSE. 3, which naturally follows 2, covers a wider range, and is intended for students preparing for more advanced work in zoölogy, and for medicine, physiology, embryology, botany, palæontology, and geology. This course is the second stage of preparation for major work in zoölogy, and, under the conditions stated below, may constitute one half the requirement for a minor.

C—APPLIED ZOÖLOGY. Course 1 is intended for students in the Schools of Applied Science as the preparation for subsequent studies in geology and palæontology. Course 15 is intended for students in Civil Engineering and in Sanitary Science, and is not dependent upon any other courses.

D—UNIVERSITY COURSES. Courses 4 to 14, founded upon 2 and 3, may be so combined as to carry the student progressively forward to the most highly specialized study and research. (1) A major in zoölogy requires, after Courses 2 and 3 (or their equivalent), Courses 5 and 6, and the equivalent of at least one additional full-year course in addition to research. (2) For a minor, Course 3 (or its equivalent) constitutes one half the requirement in the case only of students who have not taken this course as undergraduates; the remaining half comprises any one of the full-year courses, 4, 5, 8, or any two of the half-year courses, 6, 7, 9, 10, 12. Where students have been able to take Course 3 as undergraduate work, a minor comprises, in addition, the equivalent of two full-year or four half-year courses.

E—UNIVERSITY BIOLOGICAL LECTURES. In addition to the regular instruction, series of lectures of popular interest are from time to time given by members of the staff and others in the general lecture-room on the first floor of Schermerhorn. In former years, Professor Edward B. Poulton, of Oxford University, Professor C. Lloyd Morgan, of University College, Bristol, and Professor W. K. Brooks, of the Johns Hopkins University, have been the invited lecturers.

BIOLOGICAL SEMINAR. Informal discussion and criticism of biological theories in connection with the history of zoölogy. Conducted by officers of the department and graduate students. Thursday evenings, 8 P.M., at No. 20 West 82d Street.

JOURNAL CLUB. One of the special features of the department is the Journal Club, open to instructors and all advanced students, and meeting every week in the Library to report upon special investigations and to present abstracts of articles of importance in the biological journals.

Elementary Courses

I—Elementary zoölogy—A systematic and descriptive course, including a brief review of the general principles of zoölogy, especially classification, distribution, heredity, and evolution. Particular reference to extinct forms. Lectures and laboratory work. $3\frac{1}{2}$ hours, second half-year. Professor DEAN and Dr. CALKINS

Required of first-year students in Mechanical Engineering in the Faculty of Applied Science.

2—Elementary biology (zoölogy)—Introductory to morphology and physiology, and to the general principles of biology.

A longer and a shorter course, consisting of 3 and 2 exercises a week respectively. The shorter course omits the work in histology and embryology. In this course a detailed study of a series of living forms is made the basis for brief discussions of essential principles.

First Half-Year

(a)—General biology. 2 exercises a week throughout the first quarter-year. General introduction. Protoplasm and the cell. Biology of the earth-worm and the fern. Unicellular organisms: Amoeba, Pleurococcus, yeast, bacteria, infusoria. Spirogyra, Hydra, hydroids. Professor WILSON and Dr. CALKINS

(b)—Elementary zoölogy (invertebrates). 2 exercises a week throughout the second quarter-year. The earth-worm, lobster, crab, insect, mussel, starfish, ascidian. Professor WILSON and Dr. CALKINS

(c)—Elementary histology (longer course). 1 exercise a week throughout the half-year. General study of animal cells and tissues. Dr. CALKINS

Second Half-Year

(d)—Elementary zoölogy (vertebrates). 2 exercises a week. The lancelet, dogfish, frog, pigeon, and rabbit. In addition the main problems of evolution and heredity are briefly explained. Professor DEAN and Dr. MCGREGOR

(e)—Elementary embryology (longer course). 1 exercise a week. Development of the frog, bird, and mammal, and the elementary principles of general embryology. Professor DEAN

Text-books: Sedgwick and Wilson's *General Biology*; Marshall and Hurst's *Practical Zoölogy*; Osborn's *Greeks to Darwin*. Reference books: Parker's *Elementary Biology*; Thomson's *Zoölogy*; Foster and Balfour's *Elements of Embryology*.

Open to juniors and seniors. 2 or 3 lectures and 4 or 6 hours laboratory work throughout the year.

Intermediate Course

3—General zoölogy. Vertebrate and invertebrate zoölogy, anatomy, embryology, and ætiology (natural environment, terrestrial and marine faunal areas, principles of distribution).

(a)—Classification and comparative anatomy of the main living order of fishes, amphibians, reptiles, birds, and mammals. Practical study of the skeleton, integument, muscles, nerves, viscera. Professor DEAN

(b)—Embryology of Amphioxus, fish, amphibian, bird, and mammal. Embryological technique. (Continuation of Course 2 (e).) Professor DEAN

(c)—Comparative morphology, classification, and general zoölogy of invertebrates. Dr. CALKINS

(d)—Embryology of Invertebrates. Dr. CALKINS

Text-books: Wiedersheim's *Comparative Anatomy*; Parker's *Zoöatomy*; Parker and Haswell's *Zoölogy*; Lang's *Comparative Anatomy*; Korschelt and Heider's *Embryology*.

Open to seniors and graduates. 3 lectures and 6 hours laboratory work throughout the year. The course in elementary biology (2) is a pre-requisite for this course. Students who have previously taken only the shorter course (2—a, b, d) will be required to make up the work included in Courses 2c, 2e, but the latter work will not be considered as a partial equivalent for graduate courses.

Applied Zoölogy

15—Sanitary Biology. A general course covering the main principles of zoölogy as they apply to microscopical organisms. The protozoa and other microscopic forms in their relations to odors, tastes, and appearances in drinking-waters. Methods and results. Selected readings. Dr. CALKINS

Designed for students in Civil Engineering, Sanitary Science, and Chemistry—Lecture and laboratory work. 3 hours, during first half-year.

University Courses

Each of the following courses includes a lecture and one or two days of practical work.

ZOÖLOGY, PALÆONTOLOGY, EMBRYOLOGY, CYTOLOGY

5—Comparative zoölogy. General anatomy and evolution of vertebrates and invertebrates, with special reference to phylogeny and classification. This course completes the general systematic and morphological training begun in Courses 2 and 3, and is designed to make the student thoroughly familiar with zoölogy before he begins to specialize on the vertebrate or invertebrate side. Anatomical and embryological technique. Lecture and laboratory work. 10 hours (2 days) a week. Conference readings in Gegenbaur's *Vergleichende Anatomie*, Wiedersheim's *Grundriss der Vergleichenden Anatomie der Wirbelthiere*, Parker's *Zoöatomy*, Lang's *Comparative Anatomy*. Special works, monographs, and papers are extensively used in this course. Professors WILSON and OSBORN

6—Comparative embryology. A general comparative treatment of the earlier stages of development, with especial reference to the lower vertebrates. 6 hours (1 day) a week through the first half-year (parallel with Course 5). Hertwig's *Embryology*; Marshall's *Embryology*. Professor WILSON

7—Cellular biology. General structure and functions of the cell. 6 hours (1 day) a week through the second half-year. Hertwig, *Zelle und Gewebe*; Wilson's *Cell*. Professor WILSON

8—Mammals, living and fossil. A study of the structure, evolution, and classification of the mammalia. Lecture and laboratory courses. Reference books: Flower's *Osteology*; Flower and Lydekker's *Mammals*; Zittel's *Palæontologie*. 6 hours (1 day) a week. Professor OSBORN

Reptiles, living and fossil, are treated in Course 5.

Amphibians, living and fossil, are treated in Course 5.

The latter part of this course is given in the American Museum of Natural History.

9—Fishes, living and fossil. This course is mainly morphological: it includes demonstrations, and gives especial attention to the phylogenetic relations of the sub-classes and orders of fishes. Reference books: Smith Woodward's *Catalogue of Fossil Fishes*; Günther's *Study of Fishes*, and Dean's *Fishes Living and Fossil*. 1 lecture a week during second half-year. 6 hours (1 day). Professor DEAN

9a—Embryology of Fishes. Practical study of *Bdellostoma*, *Petromyzon*, *Squalus*, *Chimæra*, *Ceratodus*, *Acipenser*, *Lepidosteus*, *Amia*, and *Teleosts*. 1 lecture a week during second half-year. 6 hours (1 day). Professor DEAN

To alternate with 9.

10—Special morphology—the Protozoa. A general treatment of the classification, morphology, and physiology of this type of organisms, and of their relations to modern theories of biology. 1 lecture a week with demonstrations, during second half-year. Bütschli, Protozoa in Bronn's *Thierreich*. Dr. CALKINS

To alternate with 10a.

10a—Special morphology—the Bryozoa. Structure and development of the Bryozoa, with special reference to their taxonomic position. 1 lecture a week during second half-year. Dr. CALKINS

11—Advanced biology. Study of special groups of animals or of special biological problems as an introduction to original investigation. 12 hours (2 days).

12—Vertebrate organogeny. The development of the principal vertebrate organs, brain, heart, alimentary and respiratory systems, skeleton of the head, trunk, and limbs, bearing upon problems of vertebrate phylogeny. Lecture and 4 hours laboratory work. Professors OSBORN and DEAN

12a—Morphology of the Head. Six lectures upon the development of the head-region and problems connected therewith. Dr. MCGREGOR

Open to graduates. Alternates with Course 5. To be given in 1899-1900.

14—Experimental embryology. A survey of the work in the fields of morphogenesis and developmental mechanics. 1 hour lecture a week during the first half-year. Reference books: Wilson's *Cell*; Morgan's *Development of the Frog*; Davenport's *Experimental Morphology*. Mr. CRAMPTON

NEUROLOGY, COMPARATIVE PSYCHOLOGY

4—Comparative neurology. An introduction to the comparative structure of the brain and nervous system of the lower and higher animals. The invertebrate nervous system is broadly treated, as throwing light upon general neurological questions as to the origin and structure of the nervous system. The vertebrate nervous system is studied more in detail, as also leading to a better comprehension of the nervous system of man. Comparative anatomy of the brain, spinal cord, and nerves in amphioxus, fishes, amphibians, reptiles, birds, and mammals. Training in the Weigert, Golgi, and other technical methods. Text-books: Edinger's *Twelve Lectures upon the Nervous System*; Gaupp's *Anatomie des Frosches*, Abth. ii, erste Hälfte; also the works of Golgi, Cajal, Lenhossék, and others. Dr. STRONG

Open to advanced seniors and graduates. Seniors 4 hours a week throughout the year. Graduates 1 day a week. Lectures and laboratory work throughout the year. A shorter supplementary course may be offered the second half-year to supply a more thorough training in neurological technique.

13—The human brain and spinal cord. This course includes a study of both macroscopic and microscopic structure, supplemented wherever necessary by references to the structure of the nervous systems of lower forms. It naturally follows 4 but may be taken separately. A previous general knowledge of histology and of the nervous systems of some of the more typical vertebrate brains is desirable. Lectures and laboratory work 4-6 hours a week throughout the year. Reference books: The text-books of Edinger, Schäfer, Obersteiner, Déjerine, van Gehuchten, and Kölliker. Dr. STRONG

Open to a limited number of graduates and to seniors under certain conditions.

15—Comparative psychology. A course of lectures on the sense-powers, instincts, habits, and intelligence of animals. During first half-year. Dr. EDWARD THORNDIKE

Equipment, Publication, Summer Work

LABORATORIES AND MUSEUM—The new zoölogical laboratories on the upper floor of Schermerhorn comprise a large general undergraduate laboratory, two graduate laboratories, a laboratory for neurology, and eight rooms for private research, besides special rooms for supplies, aquaria, and preparation, and a commodious lecture-room, library, and seminar-room. The laboratories are well equipped with optical instruments, microtomes, and other apparatus for advanced morphological work. The teaching collections include a large series of the Mediterranean and American marine types, the injected vertebrate series of Frič and Müller, an extensive set of standard and specially prepared charts and wax models, also a variety of living animals and plants contained in fresh-water and marine aquaria.

LIBRARY—The departmental library, a part of the University Library kept in the laboratory, the gift of Charles H. Senff, Esq., is a memorial to the late Dr. John I. Northrop. It embraces full sets of the standard biological works, including the journals and a rapidly increasing collection of memoirs and special monographs. A fund is available for the purchase of literature needed in connection with the special researches of students. Forty-three of the current biological journals are subscribed for. The Library of the New York Academy of Sciences is also housed in the building.

PUBLICATION—The more important papers published from the laboratory are to be collected and reissued in *Zoölogical Contributions from Columbia University*. The *University Press* issues the *Columbia University Biological Series*, a number of educational volumes originally founded upon public lectures, of which five have already appeared and a sixth will shortly be in press. Another feature in advanced instruction is the connection with the biological section of the New York Academy of Sciences, which affords opportunities for public reading, discussion, and printing of scientific papers.

Wood's Holl, Naples, The Pacific Coast, The Nile

MARINE ZOÖLOGY—The Marine Biological Laboratories at Wood's Holl, Mass., and at Cold Spring Harbor, Long Island, form a valuable adjunct to the biological instruction of the University. In the former two investigators' rooms are subscribed for by the University for the use of the Departments of Zoölogy and Physiology: the latter is available through the John D. Jones Scholarship. Circulars of the summer courses are obtainable in the department.

NAPLES—Through William E. Dodge, Esq., the University also subscribes to one-half of the American University Table, at the Naples Zoölogical Station, Italy. Applications should be made to Professor Wilson.

THE JOHN D. JONES SCHOLARSHIP, established in the University during the past two years by the Wawepex Society, is awarded to the post-graduate

student in Zoölogy designated by the head of the department. It amounts to \$200 in addition to the fee for an investigator's table at the Cold Spring Harbor Biological Laboratory.

PUGET SOUND ZOÖLOGY—In 1896 a laboratory was established upon Puget Sound, at Port Townsend, Washington. The investigation of the Pacific fauna, thus begun, has been continued at different points along the coast from Monterey, California, to Sitka, Alaska. The faunal and morphological reports of this work are now being published in serial order.

ZOÖLOGY OF THE NILE—Through the liberality of Charles H. Senff, an expedition to the Nile was made during the summer of 1898 by N. R. Harrington (Fellow), and Dr. Hunt. The materials and publications are in charge of Professor DEAN and Mr. HARRINGTON.

AMERICAN MUSEUM OF NATURAL HISTORY

The American Museum of Natural History faces Central Park at 77th Street. By an agreement between the Trustees of the University and of the Museum, effected in 1892, qualified students of the University have access, under certain regulations, to the large exhibition and study collections of the Museum. The Museum is especially strong in the departments of geology, mineralogy, invertebrate palæontology, ornithology, and mammalogy. In 1891 a department of vertebrate palæontology was established under Professor Osborn, as curator, and the extensive collections of fossil mammals being made in the West, afford new materials for the original investigations of advanced students.

SCHOOL OF POLITICAL SCIENCE
SCHEME OF ATTENDANCE
(Library Building)

HOURS.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
10.30 to 11.30	History 40, Prof. DUNNING. 410. Public Law 8, Prof. MOORE. 405.	History 11, Prof. ROBINSON. 410. Public Law 8, Prof. MOORE. 405.	History 40, Prof. DUNNING. 410.	History 11, Prof. ROBINSON. 410. History 15 and 34, Prof. SLOANE. 417.	History 15 and 34, Prof. SLOANE. 417.	History 32, Prof. OSGOOD, 10-12, 301.
11.30 to 12.30	Public Law 11, Prof. MOORE. 413.	History 12, Prof. ROBINSON. 410.	Public Law 11, Prof. MOORE. 413.	History 10, Prof. ROBINSON. 410.		
12.30 to 1.30		History 12, Prof. ROBINSON. 410.	History 30, Prof. SLOANE. 406.	History 10, Prof. ROBINSON. 410.	History 30, Prof. SLOANE. 406.	
1.30 to 2.30	Economics 3, Prof. MAYO-SMITH. 415.	History 31, Prof. BURGESS. 415. Sociology 22 and 23, Prof. GIDDINGS. 418.	Economics 3, Prof. MAYO-SMITH. 415.	History 31, Prof. BURGESS. 415. Sociology 21 and 22, Prof. GIDDINGS. 418.	Economics 3, Prof. MAYO-SMITH. 415.	
2.30 to 3.30	Public Law 1, Prof. BURGESS. 406. Economics 9 and 10, Prof. CLARK. 402.	Public Law 1, Prof. BURGESS. 406. Economics 11 and 12, Prof. CLARK. 402.	Public Law 1, Prof. BURGESS. 406. Economics 9 and 10, Prof. CLARK. 402.	Economics 11 and 12, Prof. CLARK. 402. History 41, Prof. DUNNING. 410.	Sociology 20 and 21, Prof. GIDDINGS. 415. History 14a and 14b, Profs. ROBINSON and SLOANE. 410.	

SCHOOL OF POLITICAL SCIENCE
SCHEME OF ATTENDANCE—*Continued*
(Library Building)

HOURS.	MONDAY.	TUESDAY.	WEDNESDAY.	THURSDAY.	FRIDAY.	SATURDAY.
3.30 to 4.30	Sociology 17 and 19, Prof. MAYO-SMITH. 301. Public Law 6 and 7, Prof. MOORE. 410.	History 6, Prof. OSGOOD. 402. Sociology 15, Prof. GIDDINGS. 418. Economics 5 and 7, Prof. SELIGMAN. 406.	Public Law 6 and 7, Prof. MOORE. 410. Sociology 29 and 30, Profs. MAYO-SMITH and GIDDINGS. 301.	History 6, Prof. OSGOOD. 402. Sociology 15, Prof. GIDDINGS. 418. Economics 5 and 7, Prof. SELIGMAN. 406.	Economics 3, (4th hour.) Prof. MAYO-SMITH. 418. Sociology 20 and 21, Prof. GIDDINGS. 415. History 10, Profs. ROBINSON and OSGOOD. 301.	
4.30 to 5.30	Public Law 16, Prof. GOODNOW. 402. Sociology 17 and 19, Prof. MAYO-SMITH. 301.	Economics 4, Prof. SELIGMAN. 406. Public Law 18, Prof. GOODNOW. 402.	Public Law 16, Prof. GOODNOW. 402. Sociology 29 and 30, Profs. MAYO-SMITH and GIDDINGS. 301.	Economics 4, Prof. SELIGMAN. 406. Public Law 19, Prof. GOODNOW. 402.	Sociology 24, Dr. BAYLES. 405.	

SCHOOL OF PHILOSOPHY

SCHEME OF ATTENDANCE

MONDAY, WEDNESDAY, AND FRIDAY

9.30	10.30	11.30	12.30	1.30	2.30	3.30	4.30
Anthropology 4 [W. only]	English 11	Education 4 [M. and W.]	Anthropology 3 [M. and W.]	Education 11, 26 [M. and F., Teachers Coll.]	Education 26 [M. and F. Teachers Coll.]	Classical Seminar, Greek Section [F. only]	Classical Seminar, Greek Section [F. only]
Education 16a [M. only, Teachers Coll.]	French 1, 2, 4	Education 3 B	English 13	Education 14 [Teachers Coll.]	French 3 German 2 [M. and W.]	Education B, 3 A [M. and W., Teachers Coll.]	Education 6 [W. only, Teachers Coll.]
French 2	Psychology 8	English 17 [M. and W.]	English 14 [M. and W.]	Indo-Iranian 12 [W. and F.]	Germanic 18 [M. and W.]	Education 22 a [F. only, Teachers Coll.]	French Seminar [M. and W.]
Rhetoric 6	Spanish 5 [W. only]	French 5	French 12 [First half-year]	Music 2 [W. only]	Greek 13 [M. and W.]	Education 27 [Teachers Coll.]	Methods of Classical Instruction [M. and W., first half-year]
Spanish 1		German 10 [W. and F.]	German 3 German 14 [W. and F.]	Philosophy 9 [Second half-year]	Indo-Iranian 2 [W. and F.]	French 11, 17 German 4, 5 Greek 14 [M. and W.]	Music 4 [W. only]
		Greek 6 Indo-Iranian 1 Philosophy 8 [M. and W.]	Indo-Iranian 3 [M. and W.]	Philosophy 11 [M. and W.]	Italian 3	Italian 1 Latin 5 [M. and W.]	Music 9 [F. only]
			Psychology 9 [F. only]	Psychology A [First half-year]	Literature 7 Music 3, 5 [W. only]	Music 7 [W. only]	Philosophy 12 [F. only]
					Philosophy 1	Music 8 [F. only]	Seminar 2, Education [W. only, Teachers Coll.]
						Philosophy 3 [M. and W.]	
						Philosophy 12 [F. only]	
						Rom. Philology 1 [M. and W.]	
						Seminar in Rom. Philology [F. only]	

SCHOOL OF PHILOSOPHY

SCHEME OF ATTENDANCE—Continued

TUESDAY, THURSDAY, AND SATURDAY

TUESDAY AND THURSDAY

9.30	10.30	11.30	12.30	1.30	2.30	3.30	4.30
Anthropology 2 [Tu. and Th.]	Anthropology 6 [Tu. only]	Education 5, 9, 19 [Tu. and Th., Teachers Coll.]	English 4 [Tu. and Th.]	Anthropology 1	English 16	Education 2 French 10	Education 7, 8, 10 [Teachers Coll.]
Education 13 [Tu. and Th., Teachers Coll.]	German 7 [Tu. and Th.]	Education 22a [Tu. only]	German 8 [Tu. and Th.]	Education 4 [Tu. only, Teachers Coll.]	French 13, 14	Greek 18	French 15
English 2 [Tu. and Th.]	Latin 10 [Tu. and Th.]	English 3 [Tu. and Th.]	Psychology 4 [Tu. and Th.]	French 8	Italian 4	Music 8 [Tu. only]	Music 9 [Tu. only]
German 6 [Tu. and Th.]	Literature 3 Music 5, 6 [S. only]	French 10	Spanish 4 [Th. only]	German 9	Latin 6, 14	Philosophy 6	Provençal 1
Latin 4 [Tu. and Th.]	Psychology 2 [Tu. and Th.]	Latin 15, 18, 19, 20 [Tu. and Th.]		Indo-Iranian 11	Philosophy 2	Psychology 7 [Th. 4-5, P. and S.]	[Th. only]
Music 1, 3 [S. only]	Rhetoric 1, 2	Literature 5 [S. only]		Italian 5 [Tu. only]	Psychology 11 [Teachers Coll.]	Rom. Philology 4 [Tu. only]	
Psychology 3 Rhetoric 7 (Seminar) [S. only]	Rhetoric 3 [Tu. and Th.]	Music 4 [S. only]		Literature 3	Semitic 2, 3		
Semitic 1 [Tu. and Th.]	Semitic 4, 5	Psychology 1 [Tu. and Th.]		Philosophy 7			
		Psychology 10 [S. only]		Psychology 3			
				Rhetoric 4			

SCHOOL OF PURE SCIENCE
SCHEME OF ATTENDANCE
MONDAY, WEDNESDAY, AND FRIDAY

9.30	10.30	11.30	12.30	1.30	2.30	3.30	4.30
Botany 2, 5 505 S. (W.)	Botany 2, 5 505 S. (W.)	Botany 2, 5 505 S. (W.)	Astronomy 2 604 F. (M. and W.)	Botany 2, 5, 8 505 S. (W.)	Botany 2, 5, 8 505 S. (W.)	Botany 2, 5, 8 505 S. (W.)	Mechanics 3 613 F. (F.)
Botany 4, 6 505 S. (M. and F.)	Botany 4 505 S. (M. and F.)	Botany 4 505 S. (M. and F.)	Chemistry 21 — H. (W. and F.)	Mechanics 10 613 F. (M.)	Mechanics 3 615 F. (M.)	Mechanics 3 615 F. (M. and F.)	Physics 31 301 F. (4.45)
Physics 1 301 F.	Chemistry 25 309 H.	Chemistry 1 309 H.	Chemistry 24 309 H.		Mechanics 10 613 F. (M.)	Mechanics 15 301 E. (W.)	
Zoology 9 601 S. (F.)	Mechanics 1 609 F.	Chemistry 4, 20 — H.	Geology 3 401 S.		Mechanics 14 to 17 301 E. (F.)	Physics 7 304 F.	
	Mechanics 8, 9 306 E.	Geology 2 401 S.	Mechanics 6, 7 306 E.				
	Mineralogy 3 — S. (M. and F.)	Mechanics 4 302 E.	Mineralogy 4 — S. (W. and F.)				
		Mechanics 8 306 E.	Physics 1 301 F. (W.)				
		Mineralogy 5 — S. (W. and F.)	Physiological Chem. P. and S. (12-1 F.)				
		Mineralogy 8 — S. (M.)					
		Physics 4 301 F.					

SCHOOL OF PURE SCIENCE

SCHEME OF ATTENDANCE—Continued

TUESDAY AND THURSDAY

TUESDAY AND THURSDAY

9.30	10.30	11.30	12.30	1.30	2.30	3.30	4.30
Botany 3, 7 505 S. Chemistry 10 — H. (S.) Chemistry 21 — H. (Tu.) Geology 6 401 S. Physics 3 301 F. Zoölogy 10 601 S. (Th.)	Astronomy 3 604 F. Botany 3, 7 505 S. Chemistry 14 — H. Chemistry 21 — H. (Tu.)	Astronomy 1 604 F. Botany 3, 7 505 S. Geology 10 401 S. (Tu.) Physics 2 301 F.	Chemistry 3 — H. Mechanics 2 613 F. Mineralogy 6 — S. Physics 1 301 F.	Botany 1 505 S. Geology 1 401 S. Mechanics 5 613 F. Mechanics 11, 13 615 F. (Th.)	Botany 1 505 S. Geology 9 401 S. (Tu.) Physiological Chem. P. and S. (4-5)		Chemistry 2 309 H. Physics 8 304 F.

C = College
E = Engineering
F = Fayerweather

H = Havemeyer
S = Schermerhorn
P and S = College of Physicians and Surgeons

Anatomy

The courses in Anatomy are given at the College of Physicians and Surgeons, 59th Street and 10th Avenue.

Anatomy 2, Monday, 10-11, 11-12 ; Thursday, 12-1, 2-3.

Anatomy 3, Monday, 12-1, 2-3 ; Tuesday, 12-1, 2-3 ; Friday, 12-1, 2-3 ; Saturday, 10-11, 11-12.

Anatomy 4, Monday, 3-4 ; Saturday, 3-4.

Anatomy 12 to 24, Thursday or Saturday afternoons from 1 until 6.

Anatomy 25, Tuesday, Wednesday, and Thursday, 11-12.

Astronomy

4-9, hours by arrangement with the instructor.

Bacteriology

Courses are given at the College of Physicians and Surgeons, 59th Street and 10th Avenue, at special times, which may be learned from the department.

Mathematics

21-32 are given in College at hours designated by the department.

Mineralogy

9-11 are given in Schermerhorn at times designated by the department.

Physiology

Courses are given at the College of Physicians and Surgeons, 59th Street and 10th Avenue.

1, Th., 2-3 P.M.

2, Thursday afternoon or Friday.

3, Tu., Wed., Th., 10-11 A.M., demonstrations Tu. or W. or Th., 11 A.M.-12 M.

4, Hour on consultation.

Zoölogy

Courses 3 to 14 in Zoölogy are given in 601 to 619 Schermerhorn at hours as follows :

3 (a) Monday and Wednesday, 2.30-5.30, first half-year.

(b) Friday, 2.30-5.30, first half-year.

(c) Monday, Wednesday, and Friday, 2.30-5.30, second half-year.

4, Thursday, 2.30-5.30 ; Friday, 9.30-1.30.

5, Wednesday and Thursday, 9.30-5.30, first half-year ; Monday and Wednesday, 10-5, second half-year.

6, Tuesday, 10-5, first half-year.

7, Tuesday, 10-5, second half-year.

Other hours after consultation.

COMMITTEE ON EMPLOYMENT FOR STUDENTS

The design of the Committee on Employment for Students, of which Prof. James F. Kemp of the Faculty of Pure Science is Chairman, is to put students desiring to work their way through college, especially those coming from elsewhere than New York or its immediate vicinity, in the way of earning enough for their partial or complete support ; or if possible to extend assistance to them in other ways while they are pursuing their studies here. Some of the openings available are private tutoring, translating, copying of various sorts, teaching in evening school, stenography, and typewriting.

All the heads of clinics in the Medical School of the University have consented to give advice, without charge, to students who present cards of introduction from the Committee. Such visitors are received, as a general rule, during office hours at private offices. This insures to students who need it the best medical advice in the city.

All communications should be addressed to the Committee.

APPOINTMENT COMMITTEE

The duty of the Appointment Committee, of which Prof. Nicholas Murray Butler of the Faculty of Philosophy is Chairman, is to recommend graduates of the College or University for teaching or other positions, and to assist competent graduates to obtain such positions. The Committee keep classified lists of those who wish employment, and will be glad to be informed promptly of present or prospective vacancies in positions for which college-trained men or women are eligible. No fees are charged for any service rendered by the Committee.

Communications in regard to vacancies and recommendations of suitable candidates for the same should be addressed to the Chairman of the Appointment Committee.

THE LIBRARY

The Library is open from 8.30 A.M. to 11 P.M. during term time, and from 8.30 A.M. to 10 P.M. during the summer vacation. All matriculated students of all departments of the University, together with all alumni, are entitled to the use, subject to the rules, of the entire University Library.

The University Library contains 275,000 volumes and is increasing at the rate of 18,000 to 20,000 volumes yearly. It is carefully arranged by subjects and is made accessible by an excellent card catalogue, both of authors and subjects. Substantially all periodicals of any scientific value in the departments of knowledge taught in the University are currently received, and the Library is unusually rich in complete files of such serials and collections, including the transactions of learned societies, both general and special. In cases of research in minute fields of investigation, where ample material is not already at hand, it has been for years the practice of the Library to purchase at once the books needed.

The books and pamphlets of the Library, together with the periodicals con-

nected with work in the Schools of Political Science and Philosophy, are shelved in special sections of the Library building. Eighteen special study rooms are provided, in immediate communication with the books in their respective subjects. In these rooms the seminar exercises of the several departments of these two faculties are held. Cards of admission to these rooms are issued by the Librarian.

Several of the departments of the School of Pure Science have, in the buildings devoted to their work, departmental libraries containing a larger or smaller body of the most frequently used books on their respective subjects. The number of such departmental libraries in the University at present is twenty-one. Graduate students in the School of Pure Science are also, on the recommendation of members of the faculty, granted cards of admission to the shelves for purposes of research.

Students and investigators in Columbia University have access, in addition to the books belonging to the University itself, to the valuable library of the New York Academy of Sciences, in Schermerhorn, to the New York Public Library, and other great collections of books in the city, both general and special. Students of economics have access to the library of the Professor of Political Economy and Finance, which is probably the most complete collection of works in political economy in the United States.

In the departments of Political Science, Sociology, and allied branches, the following are prominent among the resources for original investigation:—in public law, collections of decisions and treaties, with works in diplomatic history; in foreign law, extensive series of laws and codes, together with many periodicals; in the economic and sociological sciences, series of national, state, and local governmental reports, and statistics, in the various domains of inquiry, especially labor, finance, charity, commerce, and transportation. In sociology and anthropology, all the series and works of any note are at hand. In history, the Library is rich in the great collections of original sources issued by governmental aid or by learned societies, in Europe or elsewhere, and in many special collections.

In the School of Philosophy attention may be called to the very extensive body of books on philosophy, including a collection of books by or concerning Immanuel Kant, of more than 800 volumes. In education, the books, including those in Teachers College, now represented in the University catalogue, number in all some 10,000 volumes, and in literature and philology an extensive and rapidly increasing body of material is at hand. In this connection should be noted the Goethe collection of some 1,300 volumes and the collection in the Oriental Languages and Literatures, which, strengthened by the Semitic Library of the Temple Emanu-El, presented some years ago to the University, now numbers 15,000 volumes or more. Here, as elsewhere in the Library, complete files of all periodicals of importance are to be found.

In Pure Science, in addition to the departmental libraries before mentioned, the collections in the general Library, particularly the transactions of the learned societies, and the body of works in the mathematical and physical sciences which have been built up since the Barnard foundation became available, give ample material for research, and are being constantly supplemented.

THE GYMNASIUM

The University Gymnasium is a large and thoroughly equipped building. It is open to all students of the University.

Every student is entitled to a physical examination by the Director. On the basis of this examination, advice will be given as to the kind and amount of exercise best adapted to each man's needs. This department is under the supervision of Watson L. Savage, M.D., the Director of the Gymnasium, who is assisted by a corps of expert instructors.

PUBLIC WORSHIP

Chapel service is held every week day, except Saturday, in 305 Schermerhorn, at 9.10 A.M. The service lasts fifteen minutes, and consists of singing, reading the Scriptures, prayers, and generally an address by the Chaplain. Attendance is wholly voluntary. All officers and students of the University are invited to be present.

Academic Calendar

- 1899—June 4—Sunday. Baccalaureate Sermon.
 June 5—Monday. Class Day.
 June 7—Wednesday. Commencement Day.
 Oct. 2—Monday. First half-year, 146th year, begins.
 Oct. 16—Monday. Last day of registration to obtain credit for residence for the full academic year.
 Nov. 7—Tuesday. Election Day, holiday.
 Nov. 30—Thursday. Thanksgiving Day, holiday.
 Dec. 1—Friday. Holiday.
 Dec. 2—Saturday. Holiday.
 Dec. 22—Friday,
 to
 1900—Jan. 2—Tuesday, inclusive. Christmas holidays.
 Jan. 3—Wednesday. Exercises of the University resumed.
 Jan. 29—Monday. Mid-year examinations begin.
 Feb. 10—Saturday. First half-year ends.
 Feb. 12—Monday. Lincoln's Birthday, holiday.
 Feb. 13—Tuesday. Second half-year begins.
 Feb. 22—Thursday. Washington's Birthday, holiday.
 Feb. 28—Ash-Wednesday, holiday.
 Mar. 1—Thursday. Last day for filing applications for University Fellowships.
 April 2—Monday. Last day for filing applications for examination for higher degrees.
 April 13—Good Friday, holiday.
 May 1—Tuesday. Last day for presentation of essays for the degree of Master of Arts, and for filing applications for University Scholarships.
 May 21—Monday. Final examinations begin.
 May 30—Wednesday. Memorial Day, holiday.
 *June 10—Sunday. Baccalaureate Sermon.
 *June 11—Monday. Class Day.
 *June 13—Wednesday. Commencement Day.
 Oct. 1—Monday. First half-year, 147th year, begins.

* May be moved forward one week.



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